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1.1 Preface

The MPM 100 module operating conditions :
To use the module requires at least the XTEL V52 software workshop updated with catalogue product TSX R CTG V52E.

When used in PL7-NET multi-network architecture it requires a setup version of V6 or greater.

The network diagnostics tool NETDIAG accepts module MPM 100 from V6 onwards.

PL7-3 software version have to be 5.8 or more.

1.2 Documentation structure

This documentation is designed for users who wish to set up a FIPWAY network. The documentation required is the following :

TSX DR FPW E reference manual which describes :

- FIPWAY / FIPIO network operating principles,
- Network installation and checking principles,
- Operating, adjustment and diagnostics functions,
- Technical characteristics of FIPWAY / FIPIO networks,
- A glossary of technical terms specific to networks.

TSX DM FPM 100E user manual (this document) which describes:

- The product,
- Setting up and connecting on the network,
- Network performance,
- Operation with Telemecanique software,
- Network diagnostic functions.

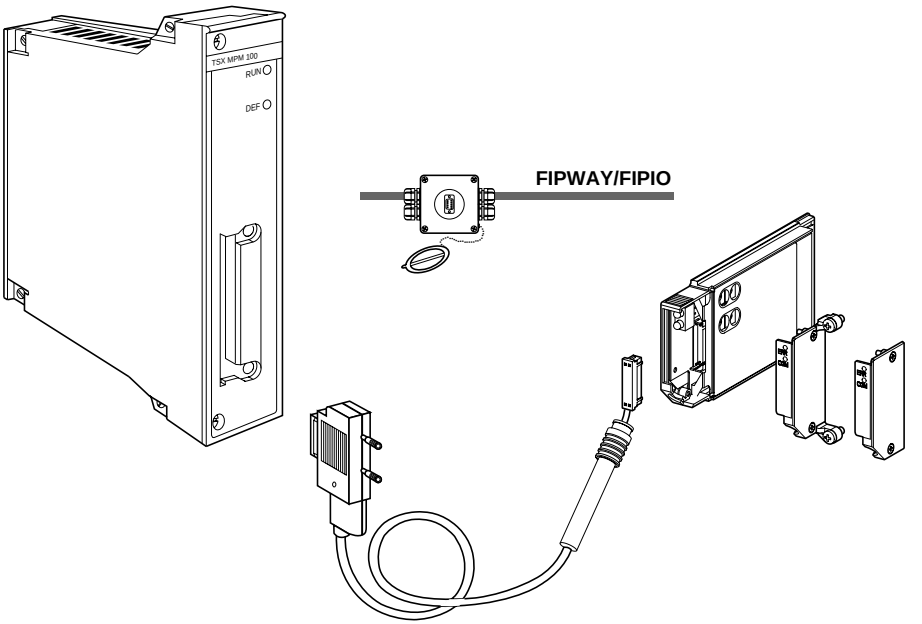
1.3 Description of the FIPWAY connection Kit

1.3-1 General

The FIPWAY TSX FPM 100 connection kit comprises :

- a TSX MPM 100 host module
- a TSX FPP 20 FIPWAY PCMCIA card
- TSX FP CG 010 connection cable
- TSX ACC 04 junction box
- TSX DM FPM 100E user manual

The TSX MPM 100 module is an intelligent module from the TSX series 7 range of PLCs. It can be installed in Model 40 PLCs (TSX and PMX 47-40 .....107-40). It provides communication functions between the PLC and any other devices on an X-WAY architecture.
It can be fitted with a TSX FPP 20 PCMCIA card for connection to a FIPWAY network.



1.3-2 Functions

The TSX MPM 100 module is fitted with the TSX FPP 20 PCMCIA card for connection to the FIPWAY network in accordance with the FIP standard and is integrated in the X-WAY communication architecture. The network number and the station number are set by rotating switches integrated in the PCMCIA card (see hardware setup).

1.4 Physical description

1.4-1 TSX MPM 100 module

The module is a single format module which can be inserted in a slot in the PLC base configurations.
The module comprises the following :

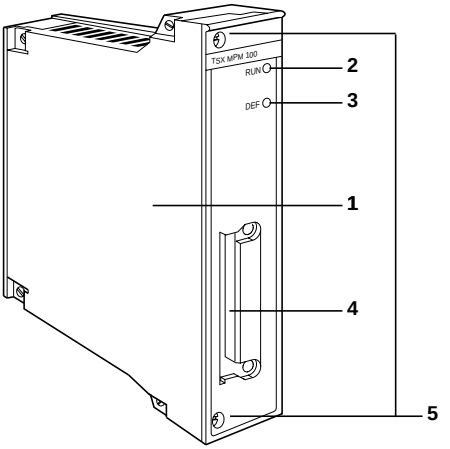
1 Metal box physically protecting the electronic circuits and providing protection against radiated interference.

2 RUN indicator lamp (green), lit when the module is running.

3 DEF (ERRor) indicator lamp (red), lit when there is a module fault.

4 Slot for TSX FPP 20 PCMCIA card.

5 Two fixing screws which attach the module in the rack and ensure electrical continuity of the ground connection.



1.4-2 TSX FPP 20 PCMCIA card

The PCMCIA card is made up of an extended type lll format metal box and comprises the following :

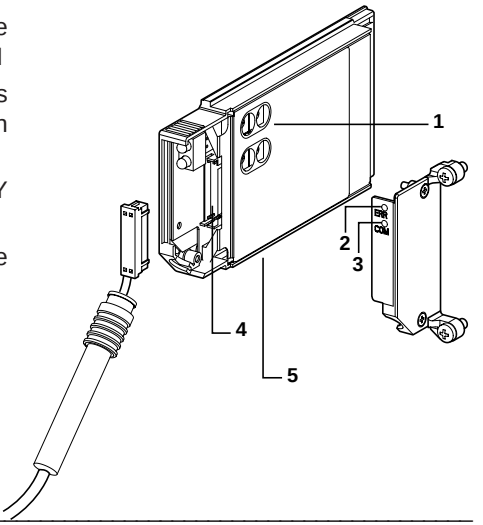
1 Circular switches for coding the network and station number.

2 ERR indicator lamp (red), lit when there is a fault in the FIPWAY PCMCIA card

3 COM indicator lamp (yellow), indicates the transmission/reception of data on the FIPWAY network.

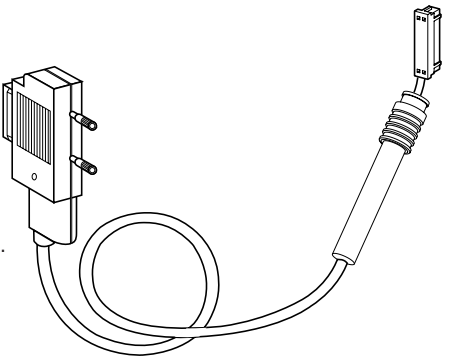
4 Connector for connection to FIPWAY network.

5 Removable cover for mounting the PCMCIA card in the host module.



1.4-3 TSX FP CG 010 connection cable

1m long, one end fitted with a 20-pin miniature connector, the other end with a 9-pin SUB-D connector, to link the PCMCIA card with the TSX ACC 4 junction box.

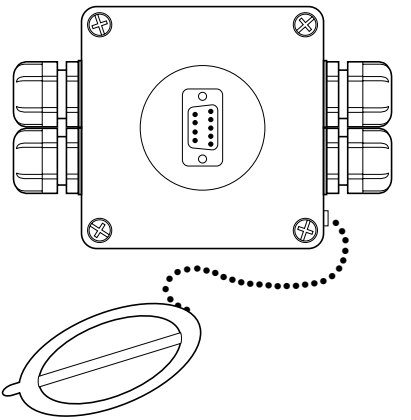


Note :
A 3m long TSX FP CG 030 cable is also available.

1.4-4 TSX FP ACC4 junction box

This junction box is used to connect the module to the FIPWAY network by connecting the TSX FPCG 010 cable.

This junction box is also used for line termination when it is at the end of the network.



1.5 FIPWAY link characteristics

Structure :

Type :	FIP standard open industrial bus

Transmission :

Binary data rate:	1Mbit / s
Medium :	shielded twisted pair

Configuration :

No. of stations :	maximum of 32 per segment, 64 overall maximum
Maximum network length :	1000m without repeater (1 segment); 5000m with repeater
No. of networks :	127 maximum FIPWAY, ETHWAY, etc

Services :

UNI-TE :	point-to-point requests, 128 bytes maximum, broadcast message service.
COM :	distributed database of 128 words of 16 bits for the first 32 stations of a segment, 4 words per station. Service which can be active or inactive in read/write mode.
Shared table :	not supported.
Application-to-application :	point-to-point message service, 128 bytes maximum express data exchanges, 16 bytes maximum for the first 16 stations of a segment, service always active.
Other functions :	transparency of communication with any device in a TSX 7 architecture via the master device. Diagnostics, debugging, adjustment and programming of PLCs.
Data integrity :	frame check on 16 bits.
Supervision :	bus status table, transmission error counters, device status can be accessed from each PLC.

1.6 Hardware installation

1.6-1 Mounting the module in racks

Model 40 PLCs :

TSX and PMX 47	Slot 0 to 7	maximum of 1 module
TSX and PMX 67	Slot 0 to 7	maximum of 2 modules
TSX and PMX 87	Slot 0 to 7	maximum of 4 modules
TSX and PMX 107	Slot 0 to 7	maximum of 4 modules

Note : TSX MPM 100 modules can only be mounted in a main rack.
The integrated FIP link configured for FIPWAY is considered as a network module. It must therefore be included when calculating the maximum number of network modules. On the other hand, the integrated FIP link configured for FIPIO must not be included as a network module.

Locating devices :

Hardware The decimal code defined by three locating devices located at the rear of the module :	719
Software The software code entered during I/O configuration on the programming terminal :	15

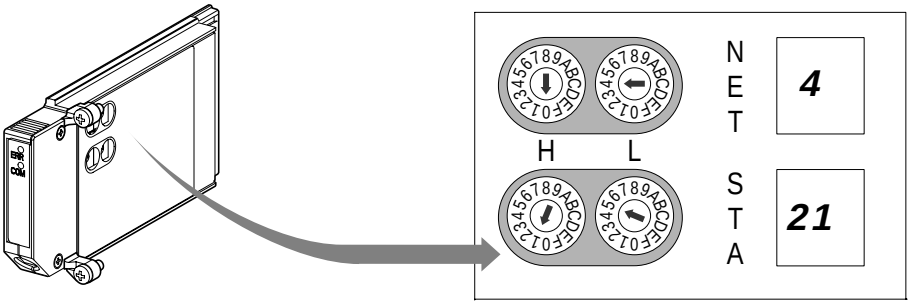
Important :

Installing : removing modules while powered up :
- the host module must not be installed or removed while powered up,
- the PCMCIA card in the host module must not be installed or removed while the module is powered up,
- however, it is possible to connect a module to the FIP network via the TSX FP CG 010 cable on the TSX FP ACC4 junction box when the network is powered up.

1.6-2 Mounting the PCMCIA card :

- position the 20-pin miniature connector end of the TSX FP CG 010 cable (1m long) on the connector on the PCMCIA card,
- secure the cover with brackets using the two screws (0.2 Nm tightening torque),
- program the network and station numbers using the selector switches,
- insert the PCMCIA card in the host module (powered down) and lock it using the fixing screws,
- connect the other end of the TSX FP CG 010 cable to the FIP junction box.

Setting the network and station numbers



Each selector switch position corresponds to a hexadecimal value between 0 and F. Possible values therefore range from 00 to FF, or 0 to 256 decimal. The recognition software however restricts the possible values to 127 for the network number and 63 for the station number (32 stations per segment or 64 stations over 5 segments). Where there is an overflow, the PCMCIA card is declared faulty.
In the example above, the network number is H'04' or network 4 in a decimal notation. The station number is H'15' or station 21 in a decimal notation. The user can write the selected numbers on the rectangular labels.

2.1 Software installation

2.1-1 General

The TSX MPM 100 module fitted with the TSX FPP 20 FIP link must be assigned a single address on the network. The network address (NET) and station address (STA) are coded by two selector switches located on the PCMCIA card.
The addresses are coded in hexadecimal notation.

Reminders

- If the PLC needs to exchange telegrams with other modules located on the same network, then its station address must be - 15,
- If the PLC needs to exchange COM words with other modules located on the same network, then its station address must be - 31,
- In all other cases (if the module does not need to exchange COM words or telegrams with other modules located on the same segment but needs to use inter-PLC exchanges based on text blocks, etc) its station address must be less than 63,
- The network number must be 127 or lower.

2.1-2 The XTEL-CONF station tool

The XTEL-CONF station tool is used to configure rack-mounted devices (selecting the type of processor, rack-mounted modules, different task periods, etc) and remote I/O (not applicable for FIPWAY). It is not needed for configuring a FIPWAY link, in fact, modules with a FIP port operate without an XTEL configuration.

2.2 COM Service

2.2-1 General

The FIPWAY network supports the common word (COM) service of the TSX Series 7 architecture. The complete set of common words form a database which is distributed among the devices on the same network segment.

Devices which need to exchange common words with other modules located on the same FIPWAY segment must have a station address of 31 or lower.

Depending on how they have been configured in PL7-3, these stations can access a common memory zone with 128 words of 16 bits reserved for inter-PLC exchanges.

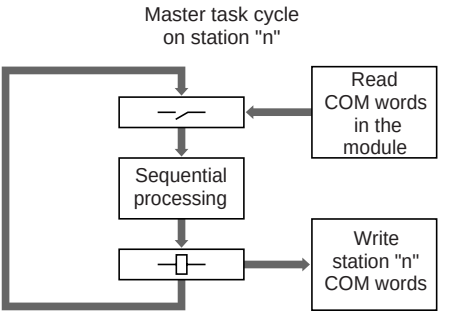
Each station which supports this service is assigned 4 common words (which can be written) from the common memory. Words assigned to other stations can only be read.

COM words are updated automatically as they change, without any intervention from the application program, at the same rate as the normal sequential activity (Master task).

At the start of each Master task scan, when the inputs are read, the PLC processor reads all of the COM words in the module which have altered in the other stations on the network .

System words and bits are used to monitor correct operation of the mechanism and to update COM words.

The user program consists simply of using PL7-3 instructions on bits or words to read or write COM words.



At the end of the Master task scan, when the outputs are updated, the PLC processor writes to the module the COM words which are assigned to it.

Comments :

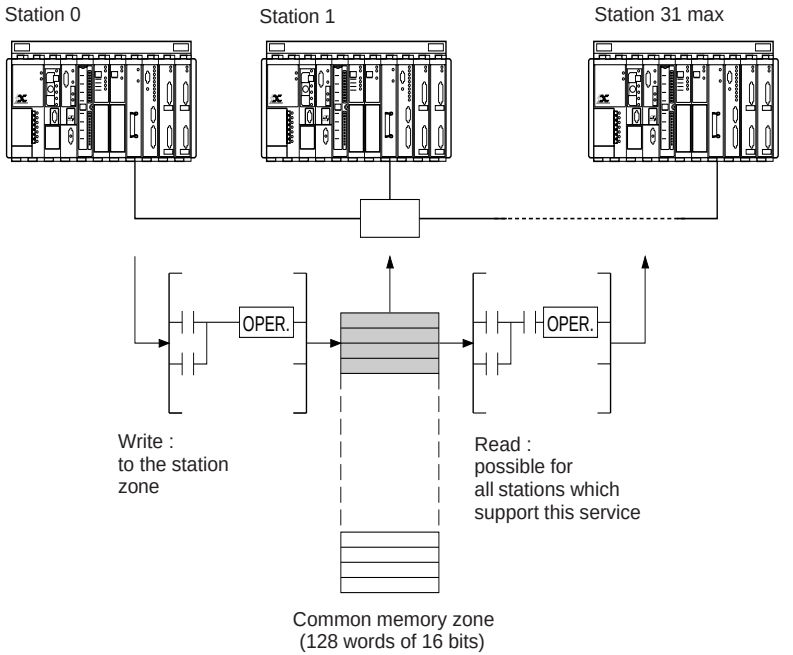
- At network level, the updating period for COM words is 40 ms.
- The update time for COM words does not depend on either the number of stations or the network load during message handling.

2.2-2 Operating principles

When the COM words of a sender station have been updated by the station processor, the module broadcasts its common words on the network.

On reception, the modules in all the PLCs using the COM service open the corresponding zone and make it available to their processor.

The use of a distributed database (COM) is recommended for periodic broadcasting of status variables, so as not to overload the application program.



2.2-3 Common memory organization

Each word in the memory can be accessed by the syntax COMs,i where :

- s = number of the station on the FIPWAY network (from 0 to 31),
- i= number of the common word (from 0 to 3),

The PLC software enables access to the individual bits of the common words. The syntax is then COMs,i,x where :

- s = number of the station on the FIPWAY network (from 0 to 31),
- i = number of the common word (from 0 to 3),
- x = number of the bit in the word for bit by bit processing (from 0 to F).

The user program of a PLC whose module has station number "s", writes the data to be transmitted on the network to its own COM s,i zone and reads data from the zones in the other stations.

2.2-4 Common word configuration

Each FIP module (address 0 to 31 on the FIPWAY network) can be configured to allow or inhibit read/write of the four common words :

- **Read/write active common words**

  The station transmits its four common words and receives common words transmitted by other stations,

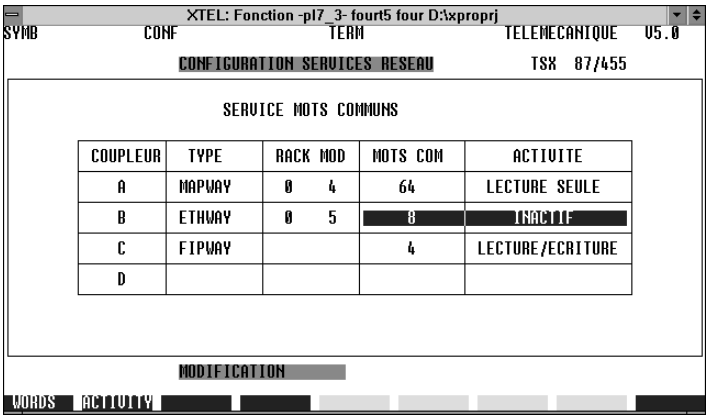
- **Read/write inhibited common words**

  The station does not transmit its four common words and does not receive common words transmitted by other stations. The other functions of the FIPWAY network (point-to-point exchange of messages, UNI-TE service, etc) remain available

Configuration procedure

This is selected when the application is configured using an FTX 507, FTX 417 or PC compatible (PL7-3 language in CONFIGURATION mode).

After selecting : "NETWORK SERVICE CONFIGURATION" a screen is displayed which offers a number of choices including modification of the activity of the common words of the station concerned :



For further information on entering the common word configuration viaprogramming terminals, refer to the "PL7-3 Operating modes" manual.

2.2-5 COM words in multinetwork operation

In a multinetwork architecture, some PLCs are connected to two or more networks (or segments) of the architecture.

The common memory zone can only be accessed by PLCs connected on the same segment. These PLCs therefore have access to two or more memory zones.

To distinguish between COM words from different networks, COMxi,j syntax is used :

where x = Logical network identifier
i = Station number
j = Word position.

The logical network identifier takes the value A, B, C or D depending on the number of interface modules in the bridge station. The identifier letter is attributed dynamically by the CPU according to the geographical location of the interface module. Each letter corresponds to a dedicated memory zone which is assigned to the designated network. The first module takes the value A (or none), the second takes value B, and so on.

The FIP module integrated in the PLC processor always takes the last identifier.

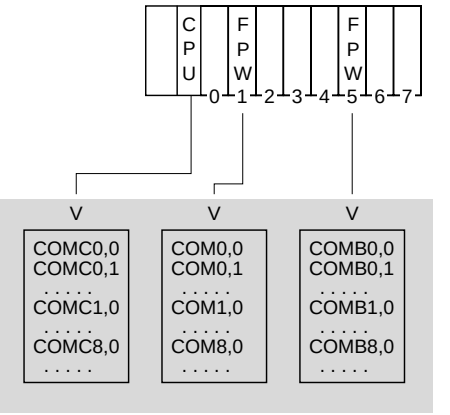
Example

Network connected to the FIPWAY port integrated in the CPU : identifier C

Network connected to the FIPWAY module in slot 1 : identifier A (no identifier for the first module)

Network connected to the module in slot 5 : identifier B

Memory zone which is common to the three networks connected to the PLC



The logical network identifier does not correspond to a network number but to a geographical location. The PLC application program is independent of the network number. The user must ensure that in the application program, the logical identifier assigned by the PLC corresponds exactly to the network which is actually connected to the module.

2.2-6 System bits and words

The user program utilizes five system bits for testing the correct operation of the network. These are bits SY11 to SY15.

System bits	Description	Function
SY11	Updating of COM words produced	Normally at 0, this bit is set to 1 when a local station has transmitted its COM words on the FIPWAY network. This bit must be reset to 0 by the program or the terminal so that other transmissions of common words can be checked.
SY12	Network A operating	Normally at 0, this bit is set to 1 when the local station module is communicating with at least one other station on the network. It does not indicate that all stations are operating. This bit is set to 0 if there is a module fault.
SY13	Network B operating	Idem SY12
SY14	Network C operating	Idem SY12
SY15	Network D operating	Idem SY12

For every PLC station module, three system words are used to test the updating of common words of the other network stations, and determine out the station numbers.

System words			
Module A	Module B	Module C	Module D
SW64	SW73	SW82	SW91
SW65	SW74	SW83	SW92
SW66	SW75	SW84	SW93
SW67	SW76	SW85	SW94
SW68	SW77	SW86	SW95
SW69	SW78	SW87	SW96
SW70	SW79	SW88	SW97
SW71	SW80	SW89	SW98
SW72	SW81	SW90	SW99

Update indicators
(1 bit per station)
stations 0 to 15
stations 16 to 31

Module network address

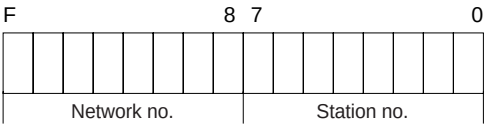
Update indicators

The 16 bits in each word represent 16 stations on the network. When a bit is at 1, the corresponding station has sent its COM words.
The bit should be reset to 0, via the program only, in order to check any new transmissions of COM words.

In the example in section 2.2-5, the FIP module has identifier B, and uses system words SW73, SW74 and SW81.

Module network address

This word indicates the network number (0 to 127) and the station number (0 to 63) corresponding to each module, in the following format :



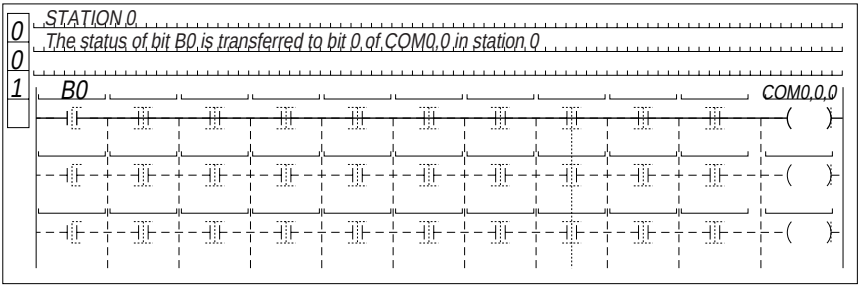
2.2-7 Application example

Transmission and reception of COM words

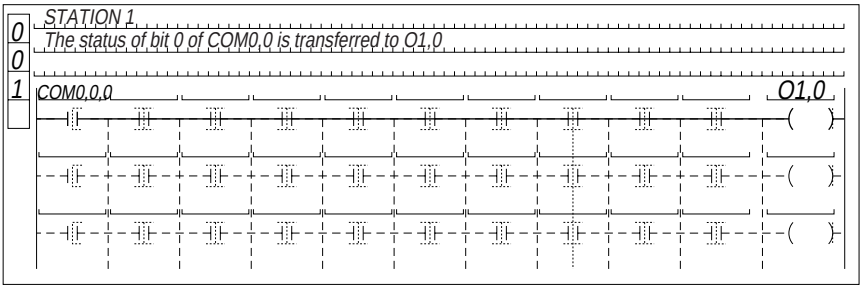
Materials handling truck can only move forward if the door is open.
Station 0 broadcasts door contact type status information
(door open : B0 = 1, door closed : B0 = 0).
On receiving this information, station 1 controls a materials handling module by activating or deactivating output O1,0 :

- If the door is open : move the truck forward,
- If the door is closed : stop the truck.

Station 0 program



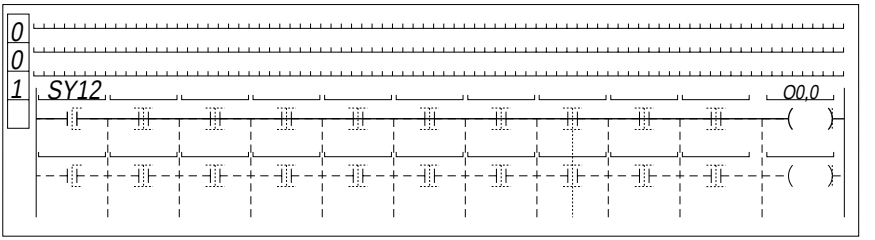
Station 1 program



Using system bits and words

The use of system bits and words is not required in all applications. However, when a station has to check the correct operation of other stations, the following tests can be performed :

SY12 : performs a global test to check that the network is operating :

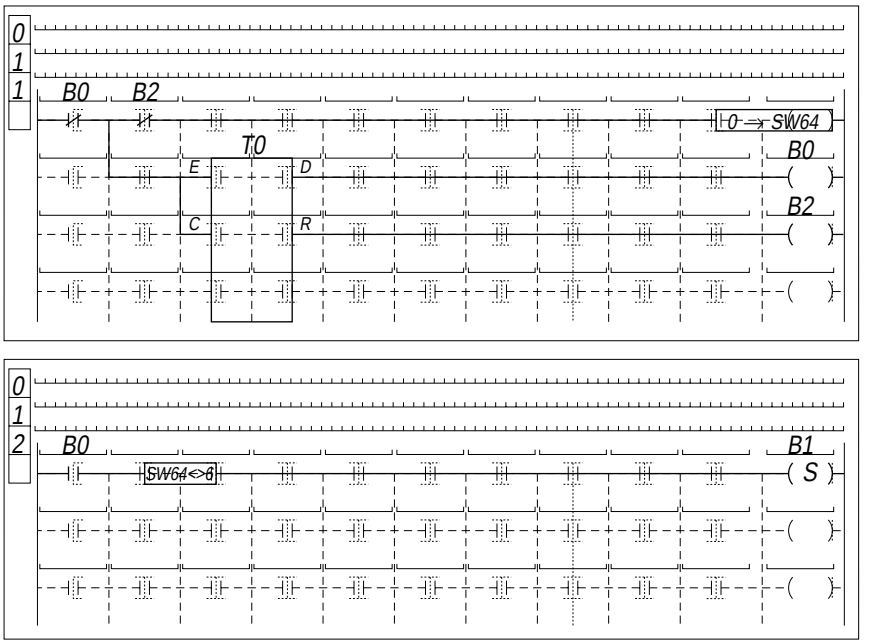


SW64 to SW99 : The user can ensure that within a predefined time (corresponding to a maximum time envelope for transferring all the COM words), the bits on all connected stations (using the COM service) have changed from 0 to 1. Diversion to a network fault management program is possible if one or more of these bits remain at 0.

Using these system words means that the status of COM words can only be changed once they have been updated. The user sets the remote station bits to 0 and checks that they change to 1.

Example

Stations 0, 1 and 2 are connected on the network. Checking from station 0 that stations 1 and 2 are working correctly can be done as follows :



2.3 UNI-TE service

2.3-1 General

Reminders

This service uses a question and answer mechanism called REQUEST/CONFIRM.
A device which supports the UNI-TE protocol can be either :

CLIENT : This device initiates communication. It asks a question (reads), and sends data (writes) or orders (Run, Stop etc). The term "requester" is sometimes used instead of CLIENT.

SERVER : This device executes the service requested by the CLIENT and sends a confirm after execution.

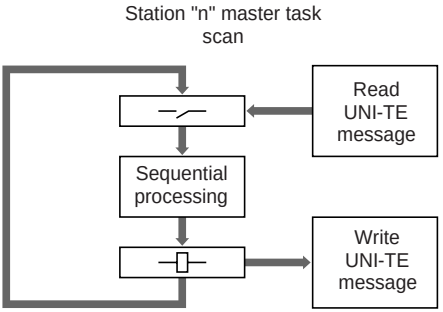
Some devices may be both CLIENT and SERVER simultaneously. For example, a PLC is a SERVER during its system tasks, (programming, adjustment, diagnostics, and other functions) and a CLIENT via the text blocks or the UNI-TE user program function (sending commands, reading status data, etc) in relation to other devices connected on the network.

On a PLC, UNI-TE requests are sent at the same speed as the master task.

Wherever the active text block is located in the program, the processor sends the appropriate request at the end of the scan.

At the start of each scan it checks whether the request has been confirmed.

Both when sending and receiving the FIP module can handle 4 messages during each PLC scan.



Note :

A summary of the use of text blocks and the UNI-TE function is provided as an appendix to this manual.

2.3-2 Services supported by PLCs

Server PLC :

A PLC acts as a server when it responds to requests sent by a client (another PLC, a supervision station, an FTX 507 programming terminal, a computer, etc). The request is formulated by the sender and then sent to the system gate of the destination PLC.

In such a case, the exchange, with a maximum size of 128 characters, is totally transparent for the server PLC application program.

Client PLC :

A client PLC sends a command or data object, or asks a question, by means of UNI-TE requests.

These requests are sent to the destination PLC via a UNITE type OFB (or SYS type NETWORK text block) with a maximum size of 128 bytes.

Requests which can be sent by the client PLC are :

- Those described later in this document (for inter-PLC dialogue),
- Those intended for a destination which is not a PLC (numerical controller, µVAX etc). If this is the case, see the equipment manual for details of how to set the address code.

Details of coding standard and specific requests supported by model 40 PLCs are provided as an appendix to this manual

2.4 Application-to-application communication

2.4-1 Point-to-point messages

The TSX FPM 100 FIP module is used for exchanging point-to-point messages. A PLC connected to the FIPWAY network can :

- at the request of its application program, send a message to another PLC in the architecture,
- receive a message coming from another PLC.

These messages are sent to their destination via a TXT type NETWORK text block and are no larger than 128 bytes. They are received by the destination PLC via a TXT type NETWORK text block.

The messages are contained in the transmission and reception tables of the text blocks. Logical connection between two stations requires simultaneous :

- **Transmission activation** (OUTPUT TXTi) of a text block by the application program of the sender station,
- **Reception activation** (INPUT TXTi) of a TXT type NETWORK text block by the application program of the destination station.

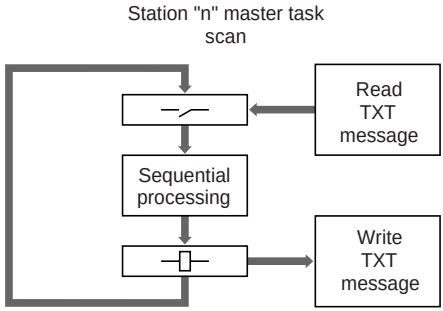
The text block parameters are :

TXTi,A : TXTi,A of the sender text block comprises the network and station numbers of the destination station
TXTi,A of the destination text block comprises the network and station numbers of the sender station.

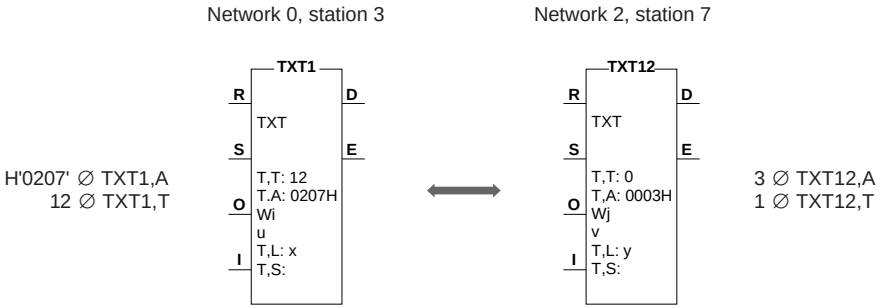
TXTi,T : TXTi,T of the sender text block comprises the number of the destination text block
TXTi,T of the destination text block comprises the number of the message sender text block.

Regardless of where in the program the text block is activated, the processor sends the appropriate message at the end of the scan.

Both when sending and receiving the FIP module in the PLC processor can handle 4 messages during each PLC scan.



Example of parameter programming :



2.4-2 Broadcast messages

A broadcast message is a message which is sent to all stations on the same network.

Broadcast messages are read by all other stations on the same network as the sender station, as long as they have a text block configured to receive these messages.

They must be sent by TXT type text blocks :

TXTi,A : Comprises the network number (of the sender station) followed by the numbers of the destination stations. This number takes the value H'FF' (eg : H'01FF' for all stations connected to network 1).

TXTi,T : Gives the numbers of the destination station text blocks for the message. All text blocks configured to receive this message must have the same number.

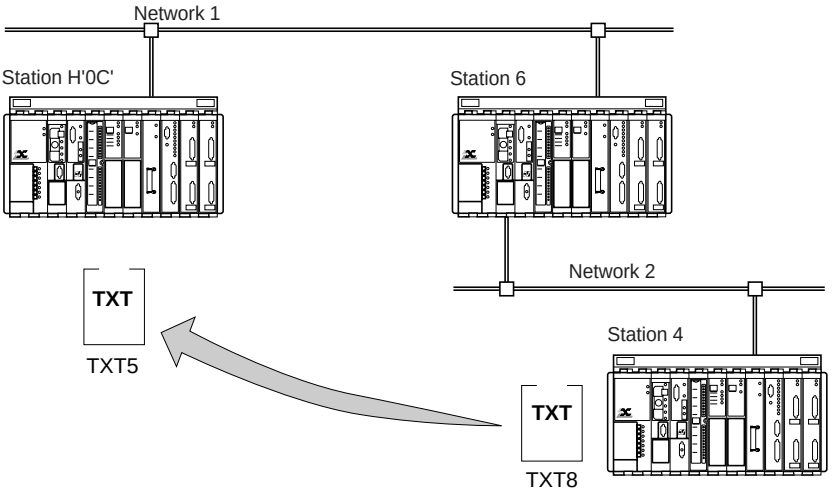
The other parameters must be initialized in the same way as a point-to-point text block.

Remember to ensure that each destination station has a text block configured for reception (INPUT TXTi) with the number of the sender message text block in its TXTi,T parameter.

All the rules which apply to text block programming apply to broadcast messages.

2.4-3 Point-to-point message example

The TSX 87-455 at address H'0204' (Network 2, Station 4) sends the message "HIGHER THRES REACHED" to the TSX 47-40 PLC at address H'010C' (Network 1, Station H'0C'). In this example, Station 6 is a bridge in the architecture.



Data

- Sender PLC (Network 2, Address 4) :
  - The message is sent by text block TXT8 of the application program,
  - Start of transmission table = W100. The transmission table comprises the message to send,
  - There is no reception table.
- Detination PLC (Network 1, Address 12 (or H'0C' in hex)) :
  - The message is received by text block TXT5 of the application program,
  - Start of reception table = W10,
  - There is no transmission table.

Message transmission

- Text block :
  - TXT8 is a TXT type NETWORK text block, programmed as OUTPUT TXTi,
  - TXT8,A = H'010C' Network 1, Detination address H'0C',
  - TXT8,T = 5 : This is the destination text block TXT5,
  - TXT8,L = 18 : Send 9 words (18 bytes),
  - W100 = Reception table address W100 corresponds in this case to the address of the transmission table as the reception table length is zero.

- Transmission table :

W100	45 (E)	53 (S)
W101	49 (I)	55 (U)
W102	20 (Space)	4C (L)
W103	41 (A)	48 (H)
W104	54 (T)	55 (U)
W105	41 (A)	20 (Space)
W106	54 (T)	54 (T)
W107	49 (I)	45 (E)
W108	54 (T)	4E (N)

Message reception

- Text block:
  - TXT5 is a TXT type NETWORK text block, programmed as INPUT TXTi,
  - TXT5,A = H'0204' Network 2, Sender station H'04',
  - TXT5,T = 8 : This is the sender Text block TXT8,
  - TXT5,L = 0 : Transmission table length zero,
  - W10 = Reception table address,
  - Reception table length = 18 bytes (W10 to W18)
  - Confirm TXT5,S = 18, reception of 18 bytes (9 words).

W10	45 (E)	53 (S)
W11	49 (I)	55 (U)
W17	49 (I)	45 (E)
W18	54 (T)	4E (N)

2.5 Priority communication - telegram

2.5-1 General

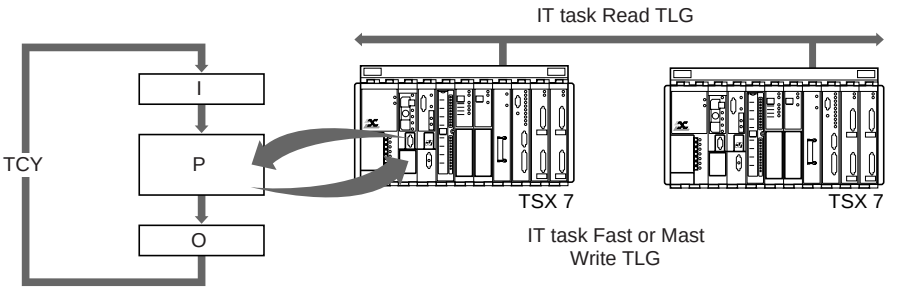
Note : The telegram service is only supported by model 40 PLCs.

A telegram is a specific type of text block used for priority transmission of short messages (up to 16 bytes) between stations with address 0 to 15 on the same network. It can be used by any task in the sender PLC (master task, fast task or interrupt task).

When a telegram is sent, the PLC processor immediately sends the message to the network interface module, without waiting for the end of master task scan.

In reception, as soon as the message is received by the network interface module, an interrupt is generated and sent to the PLC processor. The destination application interrupt task (IT task) then reads this telegram and performs any associated actions. This process enables application program to application program communication in less than 15 ms. The response time is not affected by the number of stations or the network load (either COM words or standard messages).

A telegram is sent by a TLG type NETWORK text block. An application program can only send one telegram per task (IT, FAST or MAST) in each scan to each interface module. A PLC which contains a number of modules (eg in bridge or data concentrator applications, etc) can simultaneously send a telegram from each interface module.



TLG text block parameters

The TLG text block comprises the following parameters. They must be defined during configuration :

- Text block number — TXTi,A
- Type of exchange — TLG
- Type of communication — NETWORK (NET)
- Start of table address — eg : W10
- Reception table length — 16 bytes max
- Transmission table length — TXTi,L (16 bytes maximum)
- Type of addressing — Direct or indirect

The TLG text block also comprises :

	Literal language	Ladder language
• Input bits:		
Start "transmission"	OUTPUT TXTi	S,O = 1
Start "reception"	INPUT TXTi	S,I = 1
Start "transmission reception"	EXCHG TXTi	S,I,O = 1
Cancel exchange	RESET TXTi	R = 1
• Output bits:		
"Exchange complete"	TXTi,D	
"Exchange error"	TXTi,E	
• Status word	TXTi,S	
• Detination address	TXTi,A	
• Number of the destination text block	TXTi,T	

TXTi,S

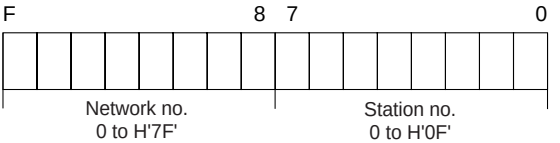
The status word (TXTi,S) contains the number of bytes sent or received (1 to 16) by the text block in its transmission or reception table when the exchange is correct.
If an exchange error occurs, (bit TXTi,E at 1) TXTi, S takes one of the following values:

1 : Current exchange cancelled by RESET
2 : Message longer than 16 bytes (in transmission)
3 : Power failure
4 : Module failure
6 : Telegram too long for the text block reception buffer
10 : Incorrect text block parameters for indirect addressing
13 : Routing error (cannot access network)
14 : System reconfiguring, module self-testing, etc
15 : Telegram channel busy (in transmission).

This variable can only be read and is significant only when the exchange is completed.

TXTi,A

The destination address (TXTi, A) must be coded using the following format :



Parameters TXTi,L; TXTi,A and TXTi,T can also be modified by program.

2.5-2 Telegram programming

Transmission

The transmission of a telegram (TLG) type text block is programmed in the same way as a TXT type text block.

Transmission is started when input "O" is set to 1 in Ladder language or by the OUTPUT TXTi instruction in Literal. The TLG text block can be started from the application program interrupt task, fast task or master task.

If transmission is unsuccessful, (destination PLC powered down, no TLG text block is configured in Input, etc), the telegram is returned to the sender interface module. This interface will then generate an interrupt. If an IT task is running and enabled (DMASKINT), it is executed. The IT task must be acknowledged (ACKINT), otherwise the PLC will generate a MEM error condition and stop the application.

The use of TXTi,E and TXTi,D bits is described in section 3.2 (data rate control).

Reception

A telegram is received by a TLG type text block.

The telegram destination module must know which text block is ready to receive the message. To do this, the text block must be set up as INPUT TXTi.

On receipt of a telegram from the network, the module gives it priority, reads it and generates an interrupt which is sent to the PLC processor. This interrupt starts the application program interrupt task which must :

- Determine which module generated the interrupt,
- Read the telegram with the "READTLG" instruction".

The module which generated the interrupt is determined by the instruction :

READINT (Ixy;Bi)
x = rack number (0),
y = module slot in the rack (0 to 7).

Bi = Copies the interrupt bit from the module to an internal bit. This bit changes to 1 when an interrupt is detected.

The telegram is read by the instruction :

READTLG(Ixy;Wi)
x = rack number (0),
y = module slot in the rack (0 to 7).

Wi = read confirm. It takes one of the following values :

0 : Reception successful,
4 : Message longer than 16 bytes (in reception),
5 : Incorrect destination address,
6 : Reception module error,
7 : Communication system reconfiguring,
8 : Telegram reception already in progress,
9 : No telegram waiting,
12 : Telegram reception refused,
13 : No TLG text block configured as an Input,
14 : Telegram received with a bad check character (BCC),
15 : Telegram channel busy.

Execution of this instruction copies the message to the reception buffer of the TLG text block, sets text block bit "D" to 1 and updates word Wi. This telegram is then available for reading and all related actions.

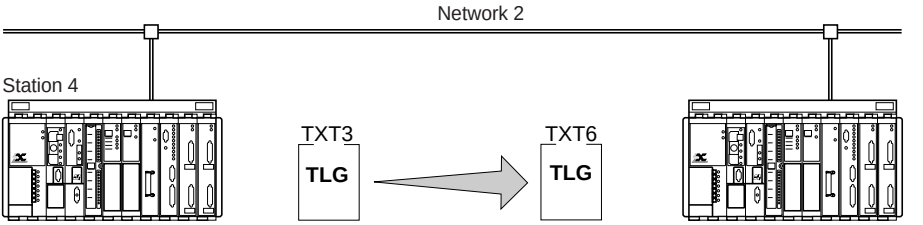
Transmission - reception

A TLG type text block can be programmed for transmission/reception by the EXCHG TXTi instruction (or by setting bits S, I and O to 1). Responding to the text block is up to the application program of the destination PLC. This response must be sent by a TLG type text block programmed as an OUTPUT. Data reception takes place as described above (interrupt detection and telegram reading). The data received is then stored in the reception table of the text block.

.

2.5-3 Example of a telegram

Transmission from the PLC at address H'0204' (Network 2, Station 4) of the message "ALARM 8" to the PLC at address H'020C' (Network 2, Station H'0C') :



Data

- Sender PLC (Station 4) :
  - The telegram is sent by application program text block TXT3,
  - Start of transmission table = W100. The transmission table comprises the message to send,
  - There is no reception table.
- Detination PLC (station H'0C') :
  - The message is received by application program text block TXT6,
  - Start of reception table : W50,
  - Length of reception table : 16 bytes,
  - There is no transmission table.

Message transmission

- Text block :
  - TXT3 is a TLG type NETWORK text block programmed for OUTPUT,
  - TXT3,A = H'020C' destination address (Network 2 station H'0C'),
  - TXT3,T = 6 : TXT6 is the destination text block,
  - TXT3,L = 8 : Transmission of 8 bytes,
  - W100 = Reception table address. As there is no reception table (length zero), W100 corresponds to the transmission table address,
  - Transmission table

W100	4C (L)	41 (A)
W101	52 (R)	41 (A)
W102	45 (E)	4D (M)
W103	38 (8)	20 (space)

- Telegram transmission

  The telegram is sent from the master task :

```
<  Transfer data to the transmission table
!  W152[4] ∅ W100[4]

<  Send telegram
!  OUTPUT TXT3
```

Message reception

- Text block :
  - TXT6 is a TLG type NETWORK text block programmed for INPUT,
  - TXT6,A = H'0204' sender address (Network 2, Station 4),
  - TXT6,T = 3 : Text block TXT3 is the sender,
  - Recept. length = 16 : Transmission of 16 bytes max,
  - W50 = Reception table address,
  - There is no transmission table, TXT6,L = 0.

The message is received in two steps :

- Master task:

```
< Activate IT task
! Start CTRL1
< Validate interrupts
! DMASKINT(I 04)
< Set text block TXT6 to receive
! INPUT TXT6
```

- Interrupt task

```
< Read the module interrupt
! READINT(I 04;B14)
< If interrupt bit (B14) is present, read the telegram
! IF B14 THEN JUMP L10
< Continue program
! .....
< Read telegram
! L10 : READTLG(I 04;W45) ; RESET B14

< Analyze correct read confirm
! IF [W45 = 0] THEN JUMP L20

< Process errors (analyze W45)
! IF [W45 = ...] THEN .....

< Number of bytes received and stored in word W30
! L20 : TXT6,S ∅ W30

< Process data received
! W50[W2] .....
< Acknowledge the interrupt
! ACKINT (I 04)
```

2.6 PLC scan cycle

Only information essential for understanding the operation of the FIP module is given.

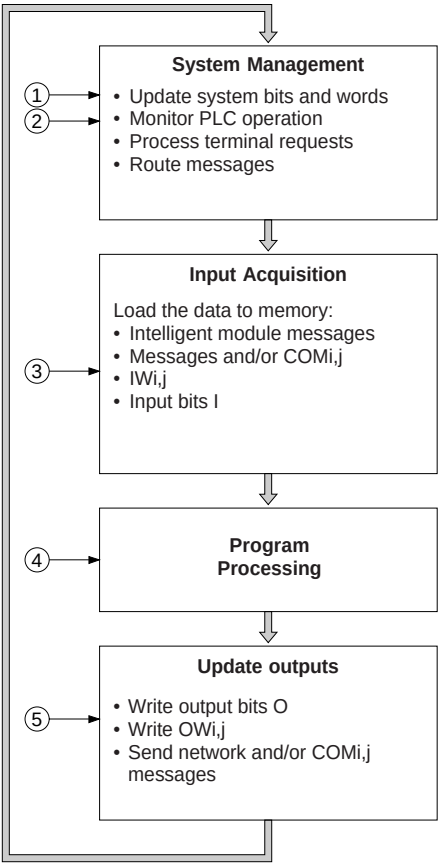
①Process system bits and words and update them when they are set by the system.

② Monitor various parameters including the presence of the FIP module and if necessary act on the fault bits SY10 or Ixy,S.

③ Write to memory the COM word data which has changed in other stations and up to 4 messages.

④ Execute the user program.

⑤ Send the COM words assigned to this station which have changed, and up to 4 messages, to the FIP module.



Important

Each master task scan can process in transmission or reception :

- COM words (4 maximum),
- Up to 4 messages at peak network load.

The sum total of all input and output messages (COM + UNITE OFB + TXT or SYS type text blocks + terminal messages) must not exceed 200 messages per second.

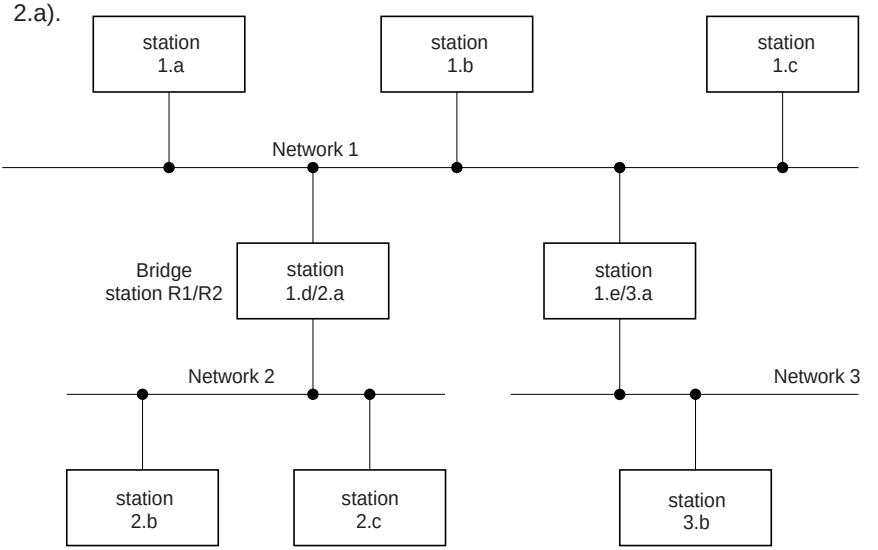
To avoid overloading the PLC, no more than two messages per scan should be exchanged, either transmission or reception.

2.7 Multinetwork configuration

2.7-1 Configuration of FIPWAY, ETHWAY, MAPWAY or TELWAY modules

In a multinetwork configuration (FIPWAY and/or ETHWAY and/or MAPWAY and/or TELWAY), there are three possible cases :

- The module is in a station which is at the end of a network drop (stations 1.a, 1.b, 1.c, 2.b, 2.c, 3.b),
- The module is in a station which contains more than one module, and is connected to different networks without being a bridge in the network architecture (station 1.e/ 3.a).
- The module is in a station which is a bridge in the network architecture (station 1.d/ 2.a).



A bridge module can be configured using PL7-NET installation software. PL7-NET is part of the X-TEL software workshop.

In the first two cases, the stations do not need to be configured using PL7-NET. All of the routing information is held by the bridge station on the network to which they are connected.

In the last case, the station must be configured using PL7-NET.

The following operations must be performed :

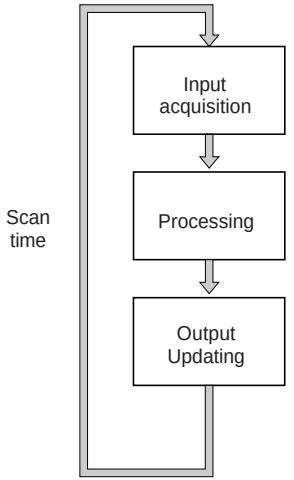
- Description of the entire network architecture and entry of the name and number (0 to H'7F') assigned to each network,
- Selection of the stations which form a network and assignment of station addresses (0 to H'3F'),
- Network interconnection by selection of PLC bridge stations,
- Assignment in each bridge of modules to the different networks,
- Storage of network architecture in a file. For each bridge, this file contains a complete list of the networks it serves,
- Transfer of this file to all of the bridge stations in the network architecture.

For more information on installation and use of this software, see the "PL7-NET software" manual.

2.7-2 PLC scan time

The performance of a bridge PLC depends on the master task scan time.

Reminders on PLC scan cycle



Data routing uses the same features of the FIP module as traditional single network message handling, ie :

- Directing UNI-TE messages from the PLC processor to the network and vice versa. These messages are used for accessing variables (all PL7 objects) in read and write modes, program transfer and management of PLC operating modes,
- Point-to-point communication from application program to application program from any station in the architecture to any other station, or broadcast communication on the local network,
- Global network management, particularly routing inter-network messages.

Both when sending and receiving, during each PLC cycle the TSX MPM 100 FIP module integrated in the PLC processor can handle two messages during continuous operation and 4 messages at peak periods.

3.1 Maintenance

3.1-1 Indicator lamps

Indicator lamps operating on two levels :

- RUN and DEF indicators on the host module
- ERR and COM indicators on the PCMCIA card

3.1-2 Indicator lamps on the TSX MPM 100 host module

RUN indicator : this green lamp indicates the general status of the host module. It is lit when the host module is operational and active. It goes off as soon as the host module becomes inoperative.
This indicator lamp lights at start-up and during the self-test phase. It goes off if any fault is detected which could prevent the host module switching to active state (a self-test fault or a problem linked to the PCMCIA card). It goes off when expiry of the internal "watchdog" is detected, and the module then becomes inoperative.

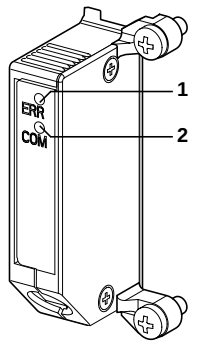
DEF indicator : when this red indicator lamp is lit it indicates that there is a fault on the host module. It lights at start-up and goes off when the host module and the PCMCIS card are operational. It is lit in the following circumstances : one of the self-tests is stopped by an error, during operation it lights briefly when a permanent software fault is detected (briefly since the host module then resets itself).

3.1-3 Indicator lamps on the TSX FPP 20 PCMCIA card

Two diagnostic indicator lamps are located on the front panel of the card. They inform the user on the operation of exchanges between the device holding the PCMCIA card and the connected device.

The red Error "ERR" (1) indicator lamp (normally off) displays faults.

The yellow Communication "COM" (2) indicator lamp displays line activity.



3.1-4 Troubleshooting

The tables below show the main faults which can be detected as well as the corrective actions to be performed.

TSX MPM 100 host module :

Symptoms	Probable cause	Corrective action
	Indicator lamp failure Power supply failure	Check power supply Replace the host module
	On start-up : Module initialization in progress	Wait for initialization to finish
	On start-up : Problem detected on PCMCIA card (absent, not supported, FIPWAY address invalid).	Check the PCMCIA card
	On start-up : Self-test fault Rapid flashing relating to the code of the test which has failed (looping back).	Replace the host module
	Other than at start-up : Stays on for 2 seconds then goes off	The module restarts spontaneously. If the situation occurs several times, call the maintenance department.
	Normal state of the display during operation.	

TSX FPP 20 PCMCIA card

Depending on their state, the PCMCIA card indicator lamps indicate the communication operating mode as well as diagnostics of the card.

State of indicator lamps

ERR	COM	Meaning	Corrective action
○	○	Device powered down No dialogue	Check power supply and connection when card inoperative
○	◍	Normal operation	
●	NS	Serious fault	Change the card
◍	○	Operational fault	Check the configuration and connection to the communication bus
◍	◍	Operational fault	Check the configuration
● LED on		○ LED off	◍ LED flashing.

NS : not significant (The indicator lamp can be in any state).

When the "ERR" indicator lamp on the TSX FPP 20 card is flashing, it indicates an external fault. These external faults are :

- line fault,
- station already present on the network,
- incorrect coding of the network-station address (coding of selector switches).

3.2 Data rate control (message handling)

Launching a UNI-TE function (or a text block) causes bits UNITEi,READY (or TXTi,D) and UNITEi,ERROR (or TXTi,E) to change state. The various possible values are :

UNITEi,READY	UNITEi,ERROR	Meaning
0	0	Exchange in progress
1	0	Exchange correctly completed or exchange not launched
1	1	Exchange incorrectly completed
0	1	Exchange not complete, initially launched with an error (not normally possible)

Power break or disconnection of the destination station

When a UNI-TE function (or a text block set up for EXCHG) sends a request, it changes to reception mode and remains in that mode until it receives a response. In the event of a power break or disconnection of the destination station, the sender function (or the text block) remains blocked. Two outcomes are possible :

- **Power failure or disconnection of the destination station during the exchange**

  Bits UNITEi,READY (or TXTi,D) and UNITEi,ERROR (or TXTi,E) remain at 0.
  The sender application program should take this case into account by including a time-out when using the function (or the sender text block).
  If no response has been received by the end of the time-out, the function (or the sender text block) must be re-initialized by setting the UNITEi,RESET bit to 1 (or by the command RESET TXTi).

- **Power failure or disconnection of the destination station before the exchange is launched**

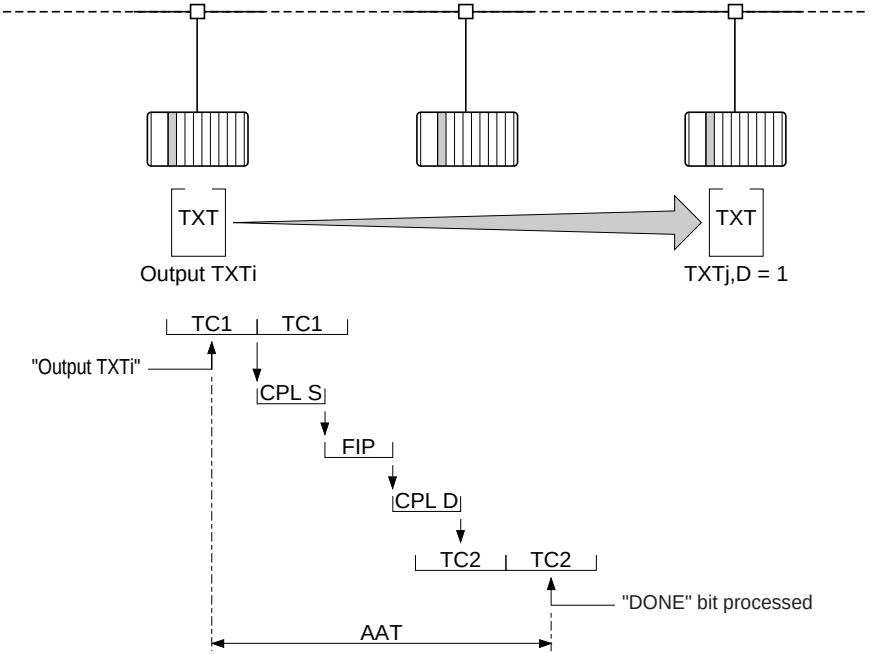
  The function (or the sender text block) malfunctions, bits UNI-TEi,READY (or TXTi,D) and UNI-TEi,ERROR (or TXTi,E) are at 1. Bit 2 of the status word UNI-TEi,STATUS1 changes to 1, (status word TXTi,S takes value 12 and TXTi,V takes value 3).

4.1 Performance

4.1-1 Transfer time for application-to-application common words

"**TCOM**" : Transfer time for application-to-application common words is the time which elapses between the moment a COM s,i value is written in the application of the source station and the moment it is read in the application of the destination station.

Example



TC1 Source PLC scan time

TC2 Destination PLC scan time

CPL S Source FIP module transmission processing time (TSX FPM 100 host module and TSX FPP 20 FIPWAY PCMCIA card)

FIP FIPWAY network transit time

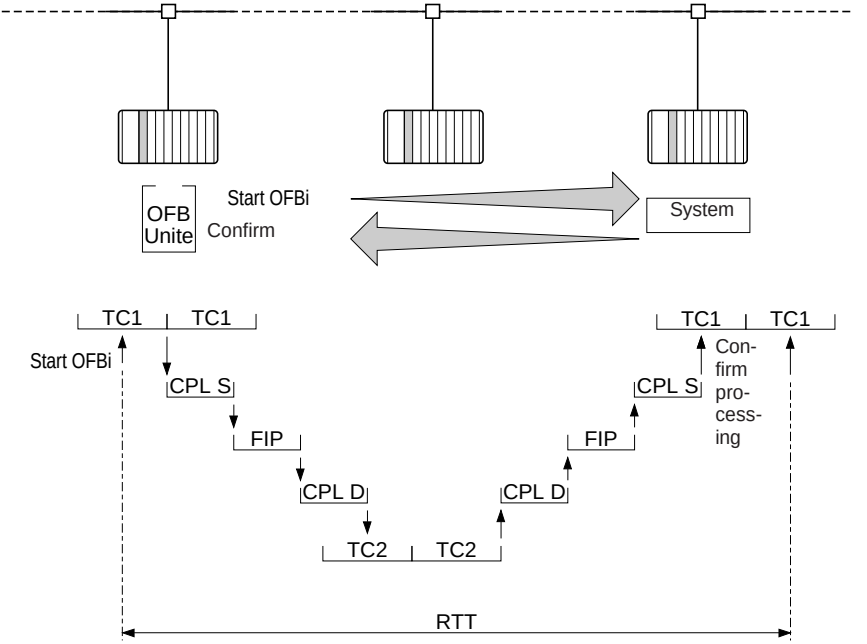
CPL D Destination FIP module transmission processing time.

For a PLC (source and destination) scan time of 50ms, the TCOM transfer time for common words is 100ms

4.1-2 Request Transaction Time

"**RTT**" : The UNI-TE Request Transaction Time is the time which elapses between transmission of a request and processing (by the source), of the confirm which is sent back.

Example



TC1 Source PLC scan time

TC2 Destination PLC scan time

CPL S Source FIP module transmission processing time

FIP FIPWAY network transit time

CPL D Destination FIP module transmission processing time.

With a network and PLC at full load, the typical RTT is 180 ms for a PLC (source and destination) scan time of 50 ms.

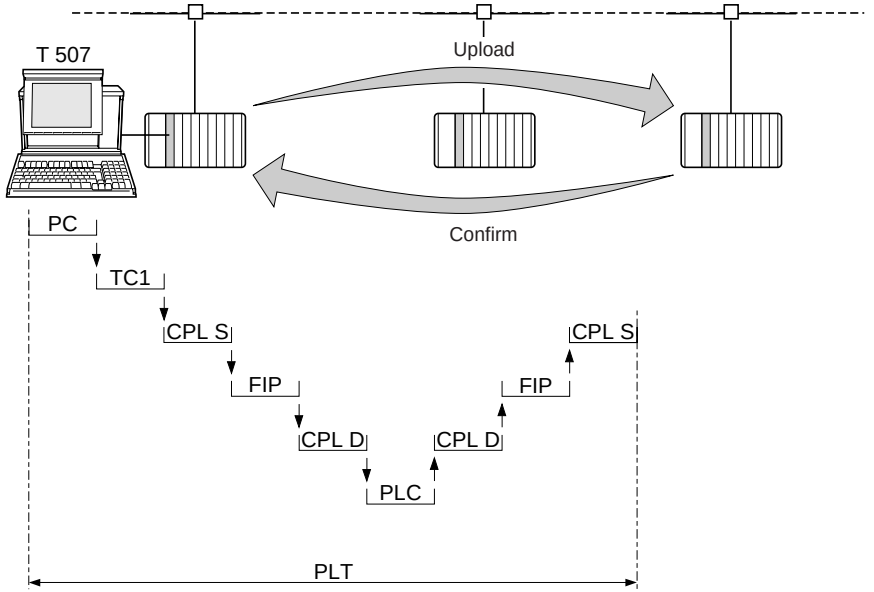
This time depends mainly on the scan time and load factor of the PLC. The network load factor makes little or no difference.

4.1-3 Uploading application programs

"**PLT**" : Program Load Time is the time required to upload (or download) an application program via FIPWAY (upload and receive confirm). It depends on the size of the program to be transferred. The transfer time will therefore be almost entirely unaffected by the network load factor.

Example

Once logical connection is established, the cycle shown below applies to each program segment of 128 bytes.



FIP FIPWAY network transit time

CPL D Destination FIP module transmission processing time

PLC Transfer time to the processor of the destination PLC (PLC stopped).

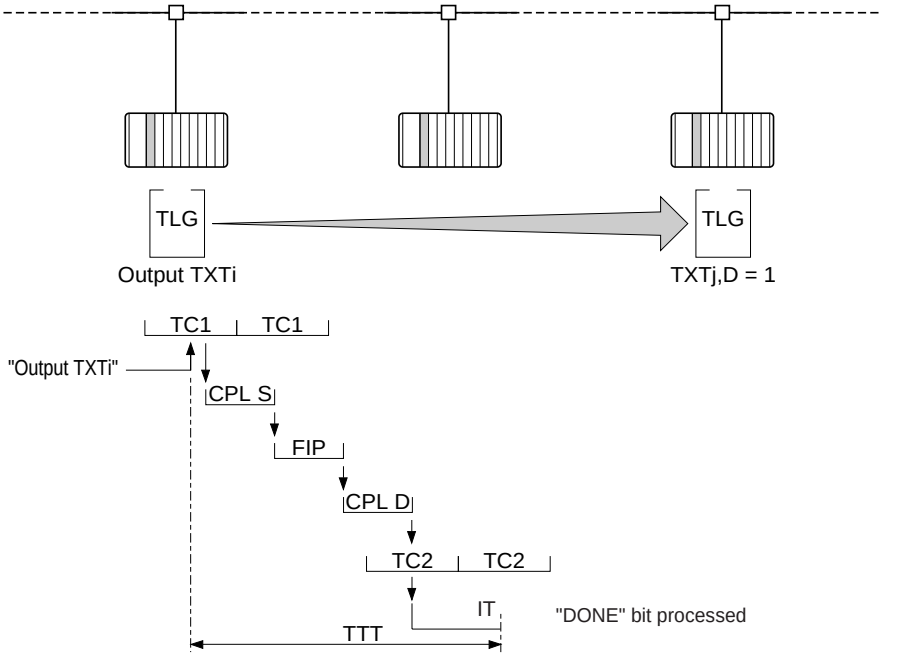
With a network and PLC at full load, the typical PLT is 1365 bytes per second. An application program of 40 Kb will be loaded in approximately 30 seconds.

This time is hardly affected by the network load factor.

4.1-4 Telegram Transfer Time

"**TTT**" : The Telegram Transfer Time is the time which elapses between telegram transmission by the source station (OUTPUT TXTi) and its reception by the interrupt task of the destination station (DONE bit accepted by the application program).

Example :



TC1 Source PLC scan time

TC2 Destination PLC scan time

CPL S Source FIP module transmission processing time

FIP FIPWAY network transit time

CPL D Destination FIP module transmission processing time

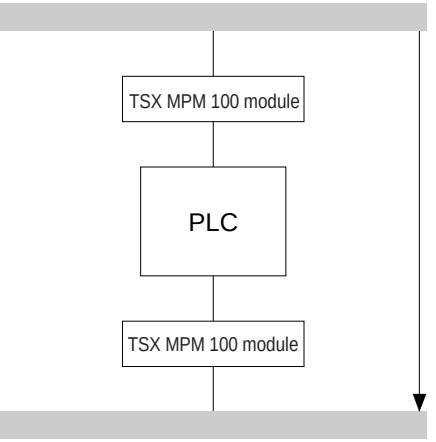
IT Interrupt task processing time.

Typical TTT is 18 ms.

It is unaffected by the PLC network load factor and scan time.

4.1-5 FIPWAY / FIPWAY Bridge Transit Time

"**FFB**" : This is the time taken for a message to move from one FIPWAY network to another FIPWAY network or vice versa via TSX MPM 100 modules. It depends on the processing time for both modules and on the time required by the bridge PLC processor to route the message.



The FIPWAY / FIPWAY bridge transit time varies from 0.9 times to twice the PLC scan time. The PLC scan time can vary from 10 ms to 100 ms. The processing time will be 1 scan time if the PLC scan time is 50 ms with no load.

5.1 Requests supported by model 40 PLCs

5.1-1 Standard requests

Service	Request	Question		Response		Meaning
		Hex	Dec	Hex	Dec	
Data (read)	Read a bit	00	00	30	48	Read a bit (B).
	Read a word	04	04	34	52	Read a word (W).
	Read objects	36	54	66	102	Read objects (bit, word, word string etc).
Data (write)	Write a bit	10	16	FE	254	Write a bit (B).
	Write a word	14	20	FE	254	Write a word (W).
	Write objects	37	55	FE	254	Write objects (bit, word, word string etc).
Run/Stop mode	RUN	24	36	FE	254	Set a device to RUN
	STOP	25	37	FE	254	Set a device to STOP.

5.1-2 Specific requests

Request	Question		Response		Meaning
	Hex	Dec	Hex	Dec	
Read a system bit.	01	01	31	49	Read a system bit (SY).
Read the image of an I/O bit.	02	02	32	50	Read the image of an I/O bit.
Read a constant word.	05	05	35	53	Read a constant word (CW).
Read a system word.	06	06	36	54	Read a system word (SW).
Read a common word.	07	07	37	55	Read a common word (COM).
Read a timer.	09	09	39	57	Read parameters of a timer (T).
Read a monostable.	0A	10	3A	58	Read parameters of a monostable (M).
Read a counter.	0B	11	3B	59	Read parameters of a counter (C).
Read a register.	0E	14	3E	62	Read parameters of a register (R).
Read Grafcet steps.	2A	42	5A	90	Read Grafcet steps (Xi).
Read a double word.	40	64	70	112	Read a double word (DW).
Read a constant double word	41	65	71	113	Read a constant double word (CDW).
Read a Grafcet step.	4B	75	7B	123	Read the status of a Grafcet step.
Write a system bit.	11	17	FE	254	Write a system bit (SY).
Write the image of an I/O bit.	12	18	FE	254	Write the image of an I/O bit.
Write a system word.	15	21	FE	254	Write a system word (SW).
Write a common word.	16	22	FE	254	Write a common word (COM).
Write a timer preset.	17	23	FE	254	Write preset value of a timer (T).
Write a monostable preset.	18	24	FE	254	Write preset value of a monostable (M).
Write a counter preset.	19	25	FE	254	Write preset value of a counter (C).
Write a register input.	1A	26	FE	254	Write a register input (R).
Write a double word.	46	70	FE	254	Write a double word (DW).

5.2 Standard requests

5.2-1 Read a bit

This request reads the value of a bit (0 or 1) and whether it is forced or not.

Request format

Request Code Hex.	Category Code	Bit Number
00/00	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Value	Forcing
30/48		

Value : An 8-bit string where the address of the first bit is the highest multiple of 8 contained in the bit number to be read (modulo 8).

Forcing : An 8-bit string used as a forcing indicator for the 8 "value" bits :
- 1 if the bit is forced, the forced value is in the "value" bit
- 0 if the bit is not forced.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Bit number out of range.

5.2-2 Read a word

This request reads a word (W).

Request format

Request Code Hex.	Category Code	Word Number
04/04	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Value
34/52	

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range.

5.2-3 Read objects

This request reads simple objects (words or word strings etc).

Request format

Request Code Hex.	Category Code	Segment	Type of Object	Object Address		Number of Objects to Read	
36/54	0 → 7						

Segment : Specifies the addressing mode used for the objects to be read and the position where they are located (in hexadecimal notation). The segments accessible by TSX Series 7 PLCs are (in hexadecimal notation) :
- 10 : Common object segment
- 64 : Internal bit space segment
- 68 : Internal word space segment
- 69 : Constant word space segment
- 6C : Ctrl. user task segment
- 80 : TSX 7 system object segment
- 81 : Function block segment
- 82 : I/O module segment

Type of object : Specifies the type of object to read :
- 0 : Text block or in-rack module
- 1 : Ctrl block
- 5 : Internal bits with forcing
- 7 : 16-bit signed integer
- 8 : 32-bit signed integer
- 64 : Task period.

Object address :
- The physical or logical address in the segment
- The sequence number of the object in the segment :
  - 0 : Current date and time in the common segment
  - 1 : Stored date and time in the common segment
  - 2 : Current date and time (in hexadecimal notation) in the common segment
  - 0 : Programming port configuration in the system segment.

Read objects (contd)

Confirm format

Positive confirm

Confirm Code Hex.	Type of Object	Data				
66/102						

Type of object : Returns the type of object selected when the request is sent.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Unknown segment or object
- Address out of range
- Too many objects for the reception buffer.

Request examples

Read words or double words

Segment : 68 (internal word segment)
Type of object : 7 ∅ Wi or 8 ∅ DWi
Object address : Index of the first Wi or DWi to read
Response : Table of n objects.

Read constant words or constant double words

Segment : 69 (constant word segment)
Type of object : 7 ∅ CWi or 8 ∅ CDWi
Object address : Index of the first CWi or CDWi to read
Response : Table of n objects.

Read programming port configuration

Segment : 80 (system object segment)
Type of object : 0 by default
Object address : 0 ∅ programming port configuration
Quantity : 0 by default
Response : 1 byte.

Read objects (contd)

Read date and time

Segment : 10 (common object segment)
Type of object : 0 by default
Object address : 0 ∅ current date and time
1 ∅ stored date and time
Quantity : 0 by default
Response : Object address = 0 (current date and time) :
YYYYMMDDHHMMSS.TN
Object address = 1 (stored date and time) :
YYYYMMDDHHMMSS.TP
YYYY = year
MM = month
DD = day
HH = hour
MM = minute
SS = second
T = tenth of a second
N = day of the week
P = AC supply power break code.

Read task period

Segment : 6C (Ctrl user task segment)
Type of object : 64 (task period)
Object address : 1 ∅ Interrupt task
2 ∅ Fast task
3 ∅ Master task
4 ∅ Auxiliary task 0
5 ∅ Auxiliary task 1
6 ∅ Auxiliary task 2
7 ∅ Auxiliary task 3
Quantity : 0 by default
Response : Task period coded on one byte (1 to 255) observing the time bases for each task (FAST = 1ms, MAST = 1 ms and AUXi = 10 ms). For the IT task, the response corresponds to the number of EXEC cycles triggered.

Read internal bits

Segment : 64 (internal bit segment)
Type of object : 5 (internal bits with forcing)
Object address : Logical number of first internal bit
Quantity : Number of bits to read modulo 8
Response : Table of n bits containing the bit values followed by another table of n bits indicating whether the corresponding bit is forced or not.

Read objects (contd)

Read date and time (in hexadecimal notation)

Segment	:	10 (common object segment)
Type of object	:	0 by default
Object address	:	2 ∅ current date and time in hexadecimal notation
Quantity	:	0 by default
Response	:	Table of eight words indicating : milliseconds seconds minutes hours day month year number of the day in the week.

Read text block parameters

Segment	:	81 (function block segment)
Type of object	:	0 (text block)
Object address	:	Logical number of first text block
Quantity	:	Number of consecutive text blocks to read
Response	:	Table of bits and words indicating for each text block :
	TXTi,D	: bit (1 = done)
	TXTi,E	: bit (1 = error)
	Indirect	: bit (1 = indirect text block)
	Remote	: bit (1 = remote text block)
	Not defined	: 4 non-significant bits
	Type	: 0 = TXT, 1 = CPL, 2 = TER, 3 = SYS, 5 = TLG
	TXTi, A	: word
	TXTi, M	: word
	TXTi, T	: word
	TXTi, C	: word
	TXTi, R	: word
	TXTi, S	: word
	TXTi, L	: word.

Text blocks which are updated in the IT or FAST tasks may be read with apparently incoherent values. This occurs because the request is handled in the Master task which is of lower priority than IT or FAST tasks.

Read objects (contd)

Read a CTRL block

Segment : 81 (function block segment)
Type of object : 1 (Ctrl block)
Object address : Logical number of first Ctrl block
Quantity : Number of consecutive Ctrl blocks
Response : Table of bytes structured as follows :
- Configured task : Bit 0 = configured
  Bits 1 to 7 non-significant
- Active task : Bit 0 = active
  Bit 1 to 7 non-significant
- Period : 0 to 255. For the IT task, this field corresponds to the activation number of this task since initialization of the application.

Read a rack-mounted I/O module

Segment : 82 (I/O module segment)
Type of object : 0 (in-rack module)
Object address : Module address defined as follows :
Bits 8 to 11 : station number
Bits 3 to 6 : rack number
Bits 0 to 2 : module number
The other bits are not significant.
Quantity : 1
Response : Table of bytes structured as follows :
- Default byte : see request to read the memory image of an I/O module
- Configuration byte : see request to read the memory image of an I/O module
- Byte indicating the configured extension code
- Byte indicating the physical value (bit 0 = acknowledgment error, bit 1 = parity error, the other bits are not significant)
- Byte indicating the extension code of the physical module.

5.2-4 Write a bit

This request sets a bit to 1 or 0.

Request format

Request Code Hex.	Category Code	Bit Number	Bit Value
10/16	0 → 7		

Bit value : 0 ∅ state 0
1 ∅ state 1.

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Bit number out of range.

5.2-5 Write a word

This request writes the contents of a word.

Request format

Request Code Hex.	Category Code	Word Number		Word Value	
14/20	0 → 7				

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range.

5.2-6 Write objects

This request writes simple objects (words, word strings etc).

Request format

Request Code Hex.	Category Code	Segment	Type of Object	Object Address	Number of Objects to Write	Data
37/55	0 → 7					

Segment : Specifies the mode and addressing field (in hexadecimal :
- 10 : Common object segment
- 64 : Internal bit space segment
- 68 : Internal word space segment
- 69 : Constant word space segment
- 6C : Ctrl user task segment
- 80 : TSX 7 system object segment.

Type of object : Specifies the type of object to write :
- 5 : Internal bits
- 7 : 16-bit signed integer
- 8 : 32-bit signed integer
- 64 : Task period.

Object address :
- Physical or logical address in the segment.
- Sequence number of the object in the segment :
  - 0 : Current date and time in the common segment
  - 1 : Programming port configuration in the system segment.

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Write objects (contd)

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Unknown object
- Last object address out of range.

Request examples

Write words or double words

Segment : 68 (internal word segment)
Type of object : 7 ∅ Wi or 8 ∅ DWi
Object address : Index of the first Wi or DWi to write
Quantity : Number
Data : Table of n objects.

Write constant or constant double words

Segment : 69 (constant word segment)
Type of object : 7 ∅ CWi or 8 ∅ CDWi
Object address : Index of the first CWi or CDWi to write
Quantity : Number
Data : Table of n objects.

Write date and time

Segment : 10 (common object segment)
Type of object : 0 by default
Object address : 0 ∅ current date and time
Quantity : 0 by default
Data : 17 ASCII characters that contain the date and time :
YYYYMMDDHHMMSS.TN,
YYYY = year
MM = month
DD = day
HH = hour
MM = minute
SS = second
T = tenth of a second
N = day of the week.

Write programming port configuration

Segment	:	80 (system object segment)
Type of object	:	0 by default
Object address	:	0 ∅ programming port configuration
Quantity	:	0 by default
Data	:	1 byte describing the new configuration.

Write task period

Segment	:	6C (Ctrl user task segment)
Type of object	:	64 (task period)
Object address	:	2 ∅ Fast task
		3 ∅ Master task
		4 ∅ Auxiliary task 0
		5 ∅ Auxiliary task 1
		6 ∅ Auxiliary task 2
		7 ∅ Auxiliary task 3
Quantity	:	0 by default.
Data	:	New task period within the time bases for each task (FAST = 1 ms, MAST = 1 ms and AUXi = 10 ms).

Write internal bits

Segment	:	64 (internal bit segment)
Type of object	:	5 (internal bits)
Object address	:	Logical number of the first internal bit
Quantity	:	Number of bits to write modulo 8
Data	:	Table of bytes containing the bit values, each byte represents eight bits (bit forcing cannot be written)

5.2-7 RUN

This request sets a device to run.

Request format

Request Code Hex.	Category Code
24/36	0 → 7

Caution : Depending on the type of device, prior reservation may be required.

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- No reservation.

5.2-8 STOP

This request stops a device.

Request format

Request Code Hex.	Category Code
25/37	0 → 7

Caution : Depending on the type of device, prior reservation may be required.

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- No reservation.

5.3 Specific read requests

5.3-1 Read a system bit

This request reads a system bit (SY).

Request format

Request Code Hex.	Category code	System bit number
00/00	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Value
31/49	

Value : An 8-bit string where the address of the first bit is the highest multiple of 8 contained in the system bit number to be read (modulo 8). Only the bit which corresponds to the desired bit is significant.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Bit number out of range.

5.3-2 Read the memory image of an I/O module

This request reads the image memory of an I/O module.

Request format

Request Code Hex.	Category Code	I/O Module Location
02/02	0 → 7	

Module location :

Bit 0 ∅ 2 : Module number
Bit 3 ∅ 6 : Rack number
Bit 7 ∅ 15 : Reserved (0).

Confirm format

Positive confirm

Confirm Code Hex.	Fault Code	Config-uration	Value	Forcing
32/50				

Fault code : Bit 7 = Fault : (0 = no, 1 = yes)
Bit 6 to 4 = 0
Bit 0 to 3 = Type of fault :
0000 : OK
0001 : Terminal block or process fault
0010 : Module absent
0011 : Module failure
0100 : Not an I/O module
0101 : Incompatible with configuration
0110 : Not configured
0111 : Self-test error.

Configuration : Bit 7 : Configuration exists (0 = no, 1 = yes)
Bit 6 : Defined type (0 = no, 1 = yes)
Bit 0 ∅ 5 : if type = 1 ∅ catalogue type number
if type = 0 ∅ default type number.

Value : The state of the module I/O bits. If it is an 8-bit module, the MSB contains zeros that are not significant. "Value" is only significant if the fault bit = 0 (bit 7) and the configuration bit = 1 (bit 7).

Read the memory image of an I/O module (contd)

Forcing : Forcing status bits :
- 0 : The bit is not forced
- 1 : The bit is forced, its forcing state is displayed in the "value" parameter.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Module number out of range.

5.3-3 Read a constant word

This request reads a constant word (CW).

Request format

Request Code Hex.	Category Code	Word Number	
05/05	0 → 7		

Confirm format

Positive confirm

Confirm Code Hex.	Value	
35/53		

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range.

5.3-4 Read a system word

This request reads a system word (SW..).

Request format

Request Code Hex.	Category Code	Word Number
06/06	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Value
36/54	

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range.

5.3-5 Read a COM word

This request reads a COM (common) word.

Request format

Request Code Hex.	Category Code	Station Number		Word Number	
07/07	0 → 7				

Confirm format

Positive confirm

Confirm Code Hex.	Station Size		Value	
37/55				

Station size : The number of COM words handled.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range
- RAM cannot be executed
- Station number out of range.

5.3-6 Read a timer

This request reads all the parameters of a timer.

Request format

Request Code Hex.	Category Code	Timer Number
09/09	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Time Base	Timer Timed-out	Timer Running	Type of Preset	Preset Value	Current Value
39/57						

Time base : 0 ∅ 10 ms
1 ∅ 100 ms
2 ∅ 1 sec
3 ∅ 1 min

Timer timed-out : 0 ∅ no
1 ∅ yes

Timer running : 0 ∅ no
1 ∅ yes

Type of preset : 0 ∅ preset cannot be modified
1 ∅ preset can be modified.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Timer number out of range
- RAM cannot be executed.

5.3-7 Read a monostable

This request reads all the parameters of a monostable.

Request format

Request Code Hex.	Category Code	Timer Number
0A/10	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Time Base	Mono-stable Running	Type of Preset	Preset Value	Current Value
3A/58					

Time base : 0 ∅ 10 ms
1 ∅ 100 ms
2 ∅ 1 sec
3 ∅ 1 min

Monostable running : 0 ∅ no
1 ∅ yes

Type of preset : 0 ∅ preset cannot be modified
1 ∅ preset can be modified

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Monostable number out of range
- RAM cannot be executed.

5.3-8 Read a counter

This request reads all the parameters of a counter.

Request format

Request Code Hex.	Category Code	Counter Number
0B/11	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Down-count Overflow	Upcount Overflow	Counter Running	Type of Preset	Preset Value	Current Value
3B/59						

Downcount overflow : 1 if the current counter value has gone from 0 to 9999.
Upcount overflow : 1 if the current counter value has gone from 9999 to 0.
Type of preset : 0 ∅ preset cannot be modified
1 ∅ preset can be modified.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Counter number out of range
- RAM cannot be executed

5.3-9 Read a register

This request reads all the parameters of a register.

Request format

Request Code Hex.	Category Code	Register Number
0E/14	0 → 7	

Confirm format

Positive confirm

Confirm Code Hex.	Register Type	Register Empty	Register Full	Register Length	Input Word	Output Word
3E/62						

Register type : 0 = FIFO register
1 = LIFO register
Register empty : 0 = no
1 = yes
Register full : 0 = no
1 = yes

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Register number out of range
- RAM cannot be executed.

5.3-10 Read Grafcet steps

This request reads the Grafcet step activity bits (XI).

Request format

Request Code Hex.	Category Code	Portion Number
2A/42	0 → 7	

Portion number : 0 = portion [X0 ••••• X127]
1 = portion [X128••• X255]
2 = portion [X256••• X383]
3 = portion [X384••• X511]

Confirm format

Positive confirm

Confirm Code Hex.	Data
5A/90	

Data : A succession of 128 bits corresponding to the step number in the selected portion :
bit i = 0 : step Xi inactive,
bit i = 1 : step Xi active.

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Portion number out of range
- No reservation.

5.3-11 Read a double word

This request reads a double word (DW).

Request format

Request Code Hex.	Category Code	Word Number	
40/64	0 → 7		

Confirm format

Positive confirm

Confirm Code Hex.	Double Word Value			
70/112				

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range
- Odd word number.

5.3-12 Read a constant double word

This request reads a constant double word (CDW).

Request format

Request Code Hex.	Category Code	Constant Double Word Number	
41/65	0 → 7		

Confirm format

Positive confirm

Confirm Code Hex.	Constant Double Word Value			
71/113				

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range
- Odd word number.

5.3-13 Read a Grafcet step

This request reads the state of a Grafcet step.

Request format

Request Code Hex.	Category Code	Type of Step	Reserved	Macro-Step Number		Step Number	
4B/75	0 → 7		00				

Type of step : 0 : Grafcet step
1 : Macro-step
2 : Macro-step entry step
3 : Macro-step exit step
4 : Macro-step step.

Macro-step nbr. : Comprises the number of the required macro-step or 0 if the step type is 0.

Step number : Comprises the number of the required step or 0 if the step type is 1, 2 or 3.

Confirm format

Positive confirm

Confirm Code Hex.	Active Step	Not Used		Not Used	Inhibited
7B/123		00	00	00	

Active step : 0 ∅ no
1 ∅ yes

Inhibited step : 0 ∅ no
1 ∅ yes

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Step number out of range.

5.4 Specific write requests

5.4-1 Write a system bit

This request writes a system bit (SY....)

Request format

Request Code Hex.	Category Code	System Bit Number		Bit Value
11/17	0 → 7			

Bit value : 0 ∅ state 0
1 ∅ state 1.

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :
- Unknown request
- Inadequate access rights
- Bit number out of range.

5.4-2 Write the memory image of an I/O bit

This request writes the memory image of an I/O bit.
As memory image processing is used, no check is made to ensure that the module exists or is operating correctly.

Request format

Request Code Hex.	Category Code	I/O Module Location	I/O Bit Number	Bit Value
12/18	0 → 7			

Module location :

Bit 0 ∅ 2 : Module number
Bit 3 ∅ 6 : Rack number
Bit 7 ∅ 15 : Reserved (0).

I/O bit number : 0 to 7 for an 8-bit module
0 to F for a 16-bit module.

Bit value : 0 or 1.

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- I/O module number out of range
- I/O bit number out of range.

5.4-3 Write a system word

This request reads a system word (SW..).

Request format

Request Code Hex.	Category Code	System Word Number		Word Value	
15/21	0 → 7				

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- System word number out of range.

5.4-4 Write a COM word

This request writes a COM (common) word.

Request format

Request Code Hex.	Category Code	Station Number	COM Word Number	Value
16/22	0 → 7			

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range
- RAM cannot be executed.

5.4-5 Write a timer preset

This request writes the preset value of a timer (T), if it can be modified.

Request format

Request Code Hex.	Category Code	Timer Number	Preset Value
17/23	0 → 7		

Preset value : Between 0 and 9999 (H'0' to H'270F').

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Timer number out of range
- Preset value cannot be modified
- Preset value out of range
- RAM cannot be executed.

5.4-6 Write a monostable preset

This request writes the preset value of a monostable (M), if it can be modified.

Request format

Request Code Hex.	Category Code	Monostable Number	Preset Value
18/24	0 → 7		

Preset value : Between 0 and 9999 (H'0' to H'270F').

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Monostable number out of range
- Preset value cannot be modified
- Preset value out of range
- RAM cannot be executed.

5.4-7 Write the preset value of a counter

This request writes the preset value of a counter (C).

Request format

Request Code Hex.	Category Code	Counter Number		Preset Value	
19/25	0 → 7				

Preset value : Between 0 and 9999 (H'0' to H'270F').

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Counter number out of range
- Preset value cannot be modified
- Preset value out of range
- RAM cannot be executed.

5.4-8 Write a register input word

This request writes a register input word (R).

Request format

Request Code Hex.	Category Code	Register Number		Input Word Value	
1A/26	0 → 7				

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Register number out of range.

5.4-9 Write a double word

This request writes a double word (DW).

Request format

Request Code Hex.	Category Code	Register Number		Double Word Value			
46/70	0 → 7						

Confirm format

Positive confirm

Confirm Code Hex.
FE/254

Negative confirm

Confirm Code Hex.
FD/253

Causes for rejection :

- Unknown request
- Inadequate access rights
- Word number out of range
- Odd word number.

5.5 Text block reminders

5.5-1 Description

A text block is a programming object which can be used by the user program for exchanging data (word tables) with various entities. There are five types of text block which characterize the type of exchange that can be performed. The various types of text block and the exchanges they can perform are listed below :

TXT type User program × Another user program
CPL type User program × Intelligent module, UNI-TELWAY bus or FIPIO fieldbus
TER type User program × PLC programming port
SYS type User program × Connected device system
TLG type User program × Another user program (short high-priority messages).

Dialogue between a PLC and other devices connected to the FIPWAY network uses TXT type text blocks for application-to-application exchanges (word table transfers), and SYS type text blocks for UNI-TE message handling service or the UNI-TE function (see section 5.6).

Dialogue between a PLC and other devices connected to the FIPIO fieldbus uses CPL type text blocks or the UNI-TE function.

5.5-2 Communication by TXT text block

TXT text block functions comprise :

• A text block number	TXTi	
• An exchange type	TXT	
• A communication type	NETWORK (NET)	
• A start of table address	eg : W10	
• A reception table length	eg : 12 bytes	
• A transmission table length	TXTi,L (in bytes)	
• Input bits :	Literal Language	Ladder Language
Start transmission	OUTPUT TXTi	S,O = 1
Start reception	INPUT TXTi	S,I = 1
Start transmission and reception	EXCHG TXTi	S,I,O = 1
Cancel exchange	RESET TXTi	R = 1
• Output bits :		
Exchange complete	TXTi,D	
Exchange error	TXTi,E	
• A status word	TXTi,S	
• A report word (usable when TXTi,S = 12)	TXTi,V	
• Destination text block number	TXTi,T	
• Destination address	TXTi,A	

The text function exchanges data as word tables which are organized as shown below :

- A transmission table comprising internal words (Wi) or constant words (CWi)
- A reception table comprising internal words (Wi), which allow the destination station to store the data received.

TXTi,D : This bit changes to 1 when the text block completes its exchange (see section 4.2 for more information)

TXTi,E : This bit changes to 1 if an exchange error occurs (see section 4.2 for more information).

TXTi,S : This word comprises the number of bytes received in the reception table of the text block if the exchange is correct. If an exchange error occurs, TXTi,S takes the following values :

1	:	Exchange cancelled by RESET
2	:	Transmission table length error
3	:	Mains failure (see section 4.2)
4	:	Module failure
5	:	Parameter error or too many active TXTs
6	:	Message received is too long
10	:	Incorrect addressing of the indirect text block
12	:	Message refused (see parameter TXTi,V)
13	:	Routing error
14	:	Resource error
20	:	Other error.

TXTi,V : If parameter TXTi,S is set to 12 (message refused), word TXTi,V indicates the cause of refusal :

1	:	Inadequate bus resources
2	:	Inadequate line resources
3	:	Cannot access destination
4	:	Line error
5	:	Length error
6	:	Network failure
7	:	Address error
8	:	Unknown request code
9	:	Inadequate CPU resources
10	:	Time-out exceeded
255	:	Other error.

TXTi,A : Comprises the destination address (network, station) in the form :

TXTi,A = H’

Network nbr.	Station nbr.
1 byte	1 byte

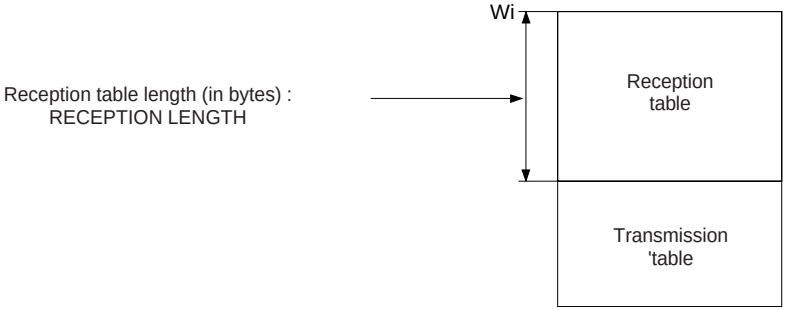
If the messages are broadcast to all stations on the same network segment (broadcast messages), the station number is set to H’FF’. Transmission of broadcast messages to all stations on the entire network is not possible.

The reception table length is set when the text block is configured. It cannot be changed by the user program.
The address of the word table to send and that of the reception table where the words received are stored can be specified in two ways :

- By direct addressing (the address is the first word of the table)
- By indirect addressing (the address is stored in a table).

Direct addressing

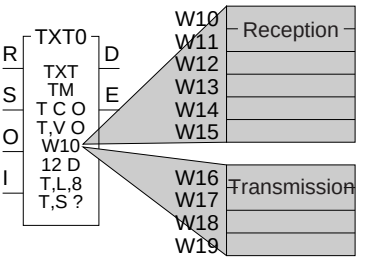
The text block reception table is stacked on top of the transmission table as shown below. The start address (ADDR BUFFER) and the length (in bytes) of the reception table (RECEPTION LENGTH) are defined when the text block is configured.



The transmission table length is defined by the user program in variable TXTi,L of the text block. It can be changed during program execution.

Example

Text block number TXT0
Start of reception table : W10
Reception table length : 12 bytes
Transmission table length : TXT0,L = 8 bytes



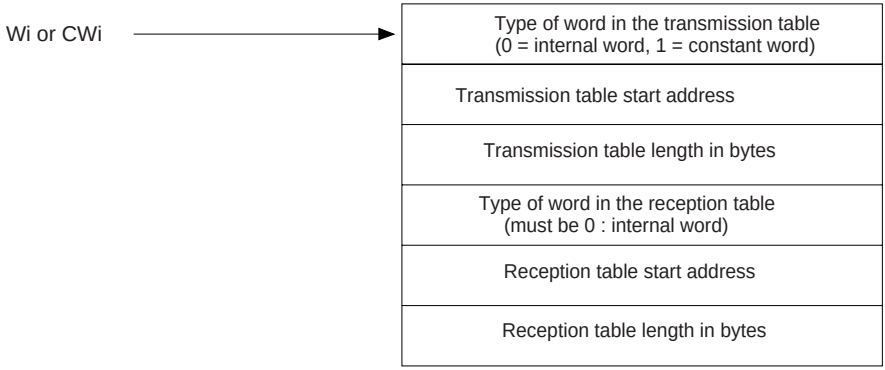
Special cases

When the text block is only used to send data :

- The reception table length can be zero
- The start of table address "ADDR BUFFER" is also the transmission table address
- The table can be located in the internal words (Wi) or in the constant words (CWi).

Indirect adressing

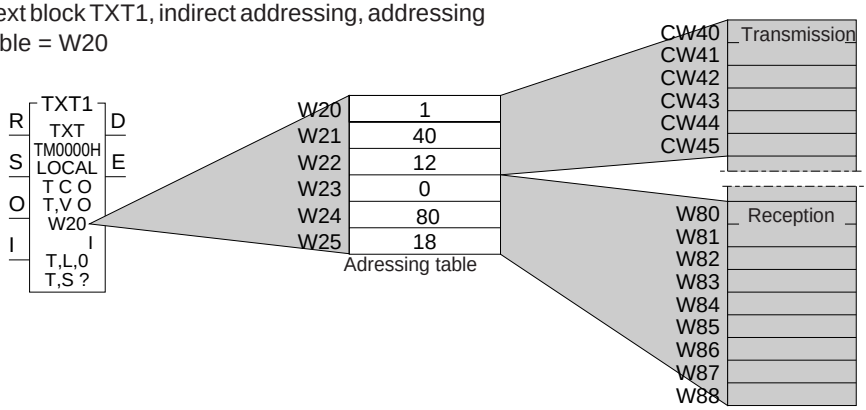
The text block transmission and reception tables are defined by a six-word addressing table which must be loaded with the information listed below:


Wi or CWi
Type of word in the transmission table (0 = internal word, 1 = constant word)
Transmission table start address
Transmission table length in bytes
Type of word in the reception table (must be 0 : internal word)
Reception table start address
Reception table length in bytes

Only the start address (Wi ou CWi) of the addressing table is defined when the text block is configured.

Example

Text block TXT1, indirect addressing, addressing table = W20



The addressing table defines the transmission and reception tables. It is composed of internal words W20 à W25, which contain the following information :

W20 : indicates the type of words in the transmission table : 1 = constant word,

W21 : indicates the address of the transmission table: 40 → CW40,

W22 : indicates the length of the transmission table : 12 bytes or 6 words. The last word in the transmission table is therefore the constant word CW45,

W23 : indicates the type of words in the reception table : 0 = internal word,

W24 : indicates the address of the reception table : 80 → W80,

W25 : indicates the length of the reception table : 18 bytes or 9 words. The last word in the reception table is the internal word W88.

5.5-3 Communication by SYS text block

The SYSTEM (SYS) text block is used to communicate with certain system functions of a device connected to FIPWAY (PLCs or non-AEG Schneider Automation device). This type of communication uses UNI-TE requests.

SYS text blocks comprise :

• A text block number	TXTi	
• An exchange type	SYS	
• A communication type	NETWORK (NET)	
• A start of table address	eg : W10	
• A reception table length	eg : 4 bytes	
• A transmission table length	TXTi,L (in bytes)	
• UNI-TE request code	TXTi,C	
• An exchange report	TXTi,V	
• A destination address	TXTi,A	
• A status word	TXTi,S	
• Input bits :	Literal Language	Ladder Language
Start transmission	OUTPUT TXTi	S,O = 1
Start reception	INPUT TXTi	S,I = 1
Start transmission and reception	EXCHG TXTi	S,I,O = 1
Cancel exchange	RESET TXTi	R = 1
• Output bits :		
Exchange complete	TXTi,D	
Exchange error	TXTi,E	

Parameters TXTi,D; TXTi,E; TXTi,A; TXTi,S and TXTi,V have the same meaning as those in TXT type text blocks.

TXTi,C : Comprises the code of the request to execute, in the form :

TXTi,C = H' | Category code (1 byte) | Request code (1 byte) | '

The category is that of the source. It takes the value 07. The other codes are reserved.

The request code is that of the request used (refer to the list of UNI-TE requests in the Appendix).

The request data is located in the text block transmission table. The report is located in the reception table if the text block was programmed as EXCHG.

TXTi,V : This word comprises the code written by the system, indicating exchange validity.

All other programming is performed in the same way as a TXT text block. The other bits and words have the same meaning.

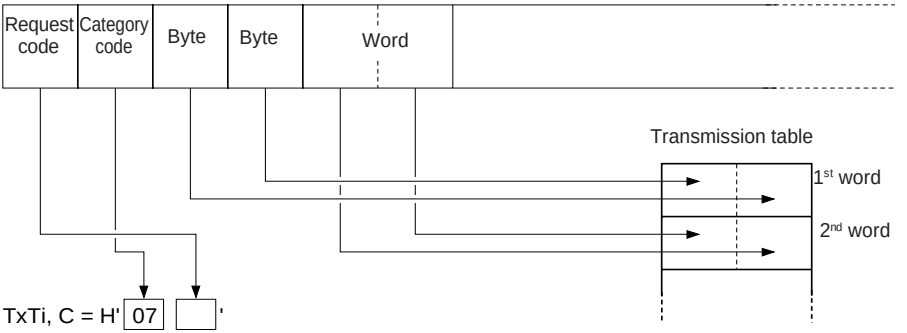
Example

TXTi,A = H'0105' corresponds to a destination station at address 5 on network 1
TXTi,C = H'0706' corresponds to a PLC sending the "read system word" request (request code H'06').

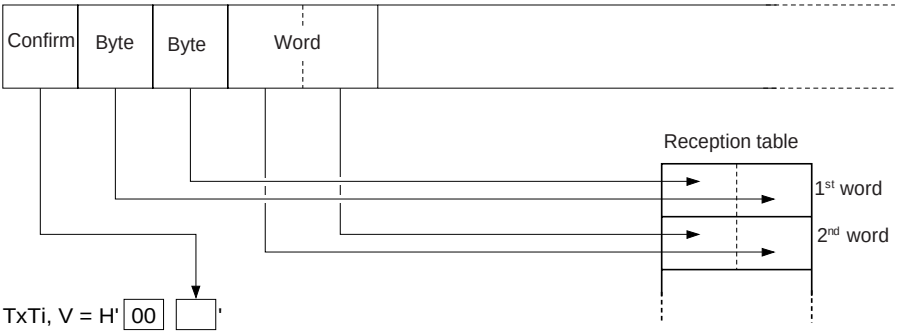
5.5-4 Table layout

The relationships between the structure of a report request and the parameters of a text block are :

Transmission



Reception



5.6 UNI-TE function reminders

5.6-1 General

PL7-COM software, reference TXT L PL7 CMM V42E, is designed to assist with the programming and implementation of communication applications. It contains the UNI-TE and other functions.

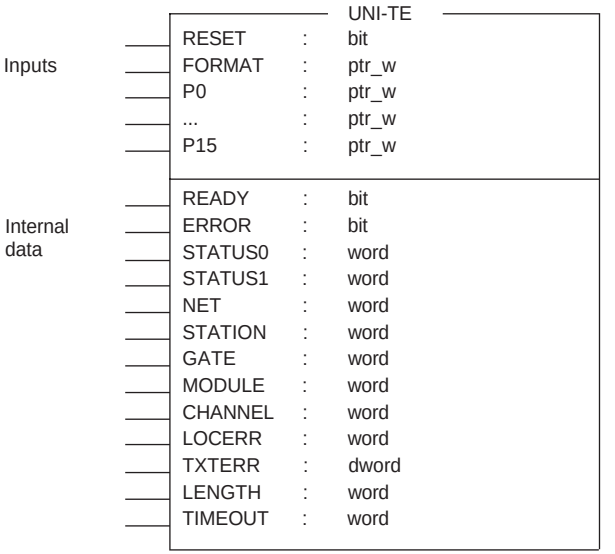
The UNI-TE function is used for communication programs and data exchanges with remote stations using the UNI-TELWAY protocol, located in single or multi-network architectures.

This section provides a brief reminder of how this function works.

For more information on the installation procedure, operation and functions provided by this program, refer to the manual "PL7-COM, Setup software for communication modules".

5.6-2 Description of the UNI-TE function

The UNI-TE function has 18 input parameters and 13 internal data objects which must be defined during the programming phase. It has no internal constants or output parameters.



5.6-3 Input parameters

Parameter	Type	Access	Description
RESET	bit	(3)	Initializes the function and cancels the current exchange. Internal data objects ERROR, STATUS0 and STATUS1 are reset to 0.
FORMAT	word	(1)	Edit format for performing conversions in the transmission buffer. Some conversion codes do not require an input parameter Pi.
P0..P15	word	(1)	Input parameters assigned to the edit format. Parameter P0 is assigned to the first conversion code which requires a Pi parameter. P1 is assigned to the second conversion code which requires a Pi parameter, etc.

(1) Read in Adjust mode (data mode, etc).
(2) Read in Program and Adjust modes (data mode, etc).
(3) Read in Program and Adjust modes (data mode, etc).
Write in Adjust mode (data mode, etc).
(4) Read in Program and Adjust modes (data mode, etc).
Write in Program and Adjust modes (data mode, etc).

Access in write in Program mode is obtained with the [PARAM] dynamic soft key.

5.6-4 Internal data

Parameter	Type	Access	Description
READY	bit	(2)	Indicates whether the function is being executed or not. It is set to 0 during execution and returns to 1 once execution is complete. This bit can be accessed directly via UNITEi,READY.
ERROR	bit	(2)	Error bit which is set to 1 when an error occurs during generation or transfer of the transmission buffer. It is reset to 0 after a RESET.
STATUS0	word	(2)	Identifies the cause of an error by setting the corresponding error bit to 1 (see section 5.7-5).
STATUS1	word	(2)	Identifies the cause of a message refusal by setting the corresponding error bit to 1 (see section 5.7-5).
NET	word	(4)	Network number of the target application entity. Its default value is 0.
STATION	word	(4)	Station number of the target application entity. Its default value is 254.
GATE	word	(4)	Gate number of the target application entity. Its default value is 0.
MODULE	word	(4)	Module number of the target application entity. Its default value is 0.
CHANNEL	word	(4)	Channel number of the target application entity. Its default value is 1.
LOCERR	word	(2)	Location of the first error encountered when analyzing the edit FORMAT. This data object is useful when debugging the application.
TXTERR	double	(2)	Value of the code which caused the first FORMAT definition error.
LENGTH	word	(2)	Number of characters received during a character reception phase.
TIMEOUT	word	(4)	Maximum time allowed for executing the function, ie to analyze the command and send the data to the module. It is expressed as a multiple of 100 ms. Its default value is 0, corresponding to an indefinite time-out for transmission and reception.

(1), (2), (3) and (4) : See section 5.6-3.

5.6-5 Error list

Function status depending on the state of ERROR and READY bits

ERROR	READY	Function status
0	0	Transmission or reception in progress.
0	1	Transmission or reception completed correctly.
1	0	Cannot normally exist.
1	1	Transmission or reception ended on error. The cause of the error will be found in words STATUS0 and STATUS1.

Internal data object STATUS0

```
bit0          :  Not used.
bit1          :  Not used.
bit2    = 1   :  Syntax error
bit3    = 1   :  More than 128 characters generated

bit4    = 1   :  Characters received not used by FORMAT
bit5    = 1   :  An odd or zero number of hexadecimal characters
bit6    = 1   :  No end of format character (e)
bit7    = 1   :  Error accessing PL7 objects : Overflow, write not allowed

bit8          :  Not used.
bit9          :  Not used.
bit10   = 1   :  Negative confirm
bit11   = 1   :  Message refused ; refer to STATUS1.

bit12   = 1   :  Exchange cancelled by power break, a RESET command or a software error.
bit13         :  Not used.
bit14   = 1   :  Communication error.
bit15   = 1   :  System error : inadequate resources.
```

Internal data object STATUS1

bit0	=	1	:	Inadequate Bus resources
bit1	=	1	:	Inadequate Line resources
bit2	=	1	:	Cannot access destination
bit3	=	1	:	Line error
bit4	=	1	:	Length error
bit5	=	1	:	Network failure
bit6	=	1	:	Address error
bit7	=	1	:	Unknown request code
bit8	=	1	:	Inadequate CPU resources
bit9	=	1	:	Time-out exceeded
bit10			:	Not used.
bit11			:	Not used.
bit12			:	Not used.
bit13			:	Not used.
bit14			:	Not used.
bit15			:	Not used.

5.6-6 Using the UNI-TE function

Reminders on application development methodology with the UNI-TE function

The UNI-TE function uses a number of predefined requests (eg read a word, write a bit, etc). The coding of these predefined requests is contained in two files supplied with PL7-COM :

- UTWREQ.SCY is a symbol definition file where each symbol corresponds to a request (eg Write a word : CW100 : Wr_w)
- UTWREQ.CST is an initialization file for the constant words associated with the symbols (this file actually comprises the detailed coding of the requests).

Reading these two files provides immediate access to the predefined requests. To do so :

- Import the files UTWREQ.SCY and UTWREQ.CST located in the XPROSYS\OFB\COMM directory, into the PL7-3\MOD directory
- Run XTEL-SDBASE to load the symbols from UTWREQ.SCY into the symbol database
- Run PL7-3 to automatically assign XTEL-SDBASE mnemonic symbols to the first 115 constant words (CW0 to CW114)
- In PL7-3 CONSTANT mode, read the UTWREQ.CST file to automatically write the coding of the requests into the constant words previously defined.

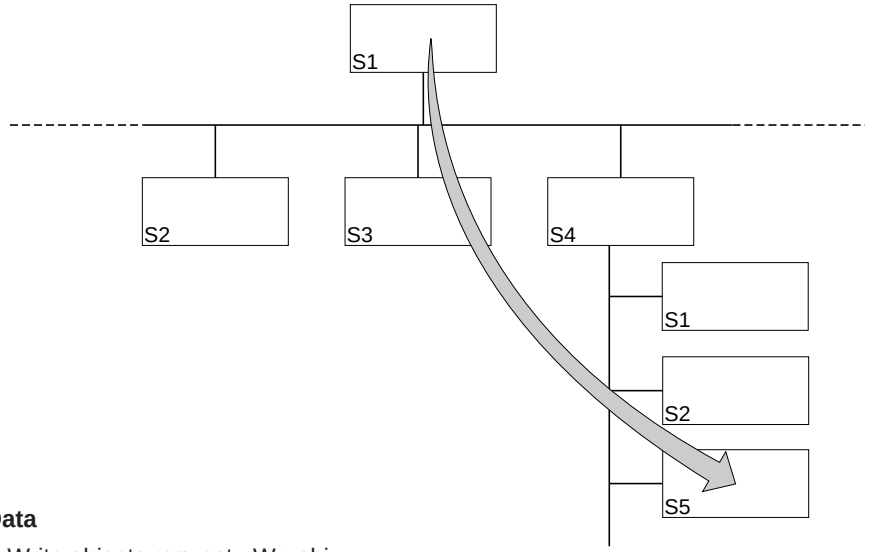
The complete list of predefined requests is provided in the manual "PL7-COM, Setup software for communication modules", part D, section 3. Other requests may also be added. For more information on this possibility, refer to the same documentation.

Execution of the function

It is advisable to link execution of the EXEC UNI-TEi instruction to a rising edge condition, to avoid continuous transmission.

5.6-7 Example

In the network architecture illustrated below, Station 1 on Network 3 sends a table comprising 50 words (W200 to W249) to Station 5 on Network 6 (from W1000 on).



Data

- Write objects request : Wr_obj
- Number of words to send : 50 (W200 to W249)
- Destination Station 5 on Network 6 (from W1000 on)

FUNCTION

- The request is sent by the UNITE0 function in the application program of Station 1 on Network 3, on the rising edge of bit B16

Program

```
< Destination address coding
! 6∅UNI-TE0,NET;  5∅UNI-TE0,STATION;  0∅UNI-TE0,GATE
< Send W200 to W249 from S1/N3 to W1000 to W1049 in S5/N6
! IF RE(B16)•UNI-TE0,READY
        THEN EXEC UNI-TE0(;Wr_obj;S_wi;T_wi;W10;W11;W12;W200)
```

- Wr_obj = Write objects request
- S_wi = Internal word segment
- T_wi = 16-bit integer type
- W10 = Address of the first word to write to destination, W10 = 1000
- W11 = Number of objects to write, W11 = 50, (50 words)
- W12 = Number of bytes to send, W12 = 100 (50 words = 100 bytes)
- W200 = Start of the word table to send.

Once the request has been sent correctly, the UNITE0,READY bit returns to 1.

5.7 List of documents to which reference is made

When setting up a FIPWAY or FIPIO application, it may be necessary to refer to the following manuals :

- "PL7-COM, Setup software for communication modules", reference TXT DM PL7 CMM V5E, for using the UNI-TE function
- "PL7-NET software", reference TXT DM PL7-NET V5E, for using PL7-NET
- "FIPWAY / FIPIO Reference Manual", reference TXT DR FIP V5E, for installation, connection, setup, etc of various devices and products on a FIPWAY / FIPIO network
- "TSX 7 and PMX 7 model 40, Setup", reference TSX DM PR40E, for setup and management of processor indicator lamps
- "PL7-3 Languages, V5 Operating Modes, reference TSX DM PL7 3 V5E", for configuring common words on model 40 PLCs
- "X-TEL Software workshop", reference TXT DM XTEL V5E, for using the XTEL-CONF tool (configuring rack-mounted devices)
- "Installation manual for TBX modules", reference TSX DM TBX T V5E, for using TBX modules.